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FOOD MANUFACTURE

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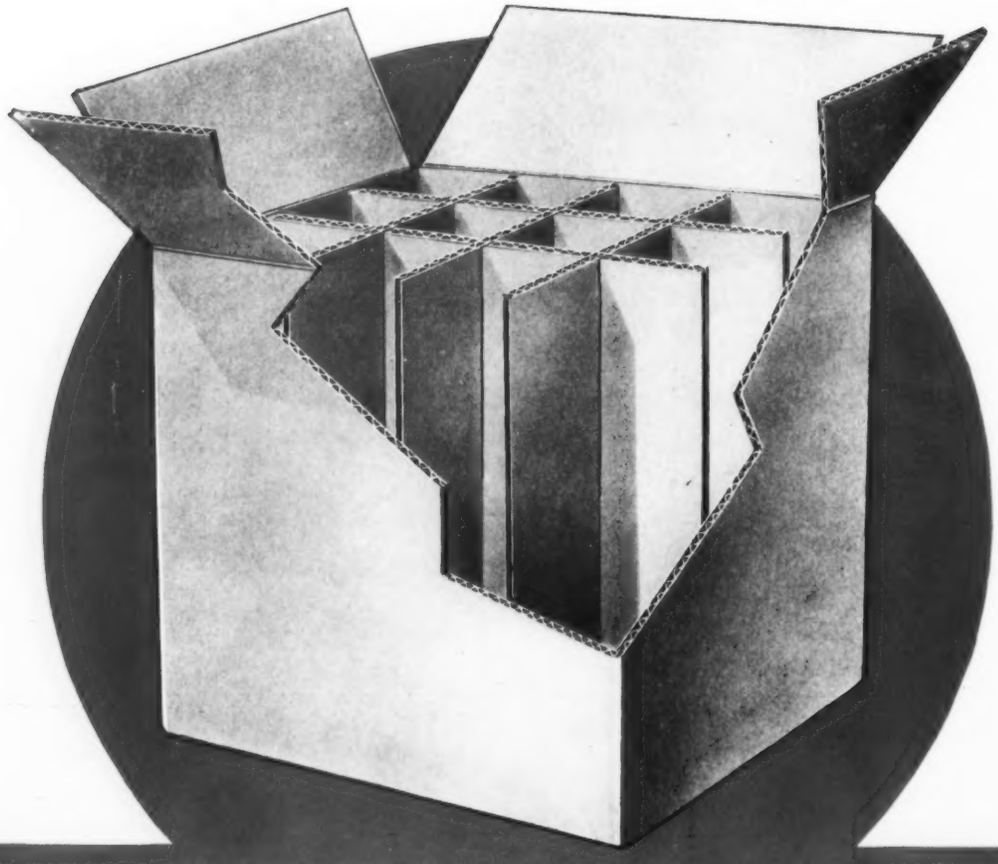

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

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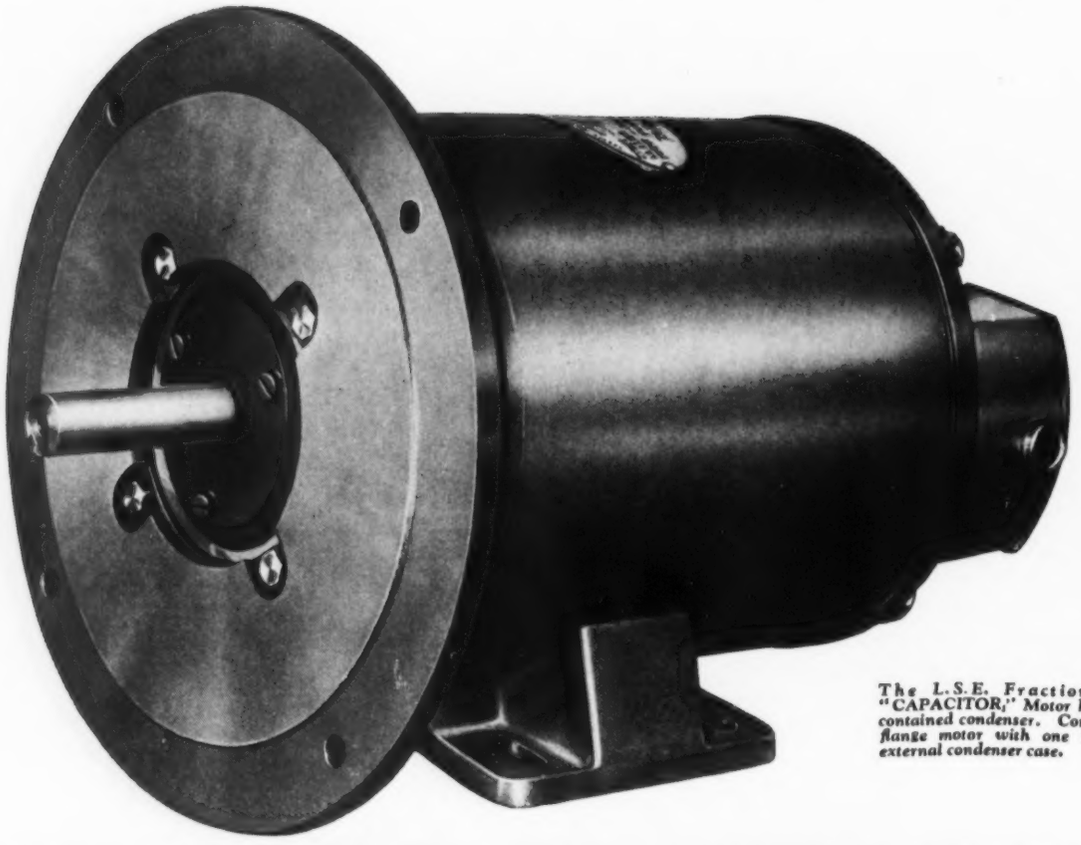

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FOOD MANUFACTURE

Vol. XII, No. 4 April, 1937

A Tax on Proprietary Foods?

AS THE revenue from Medicine Stamp Duty had dropped from well over a million pounds in 1929 to almost half that amount in 1935 the Government decided that something must be done about it, and so set up a Select Committee to examine and report on the cause of it. The report, which shows obvious signs of having been rushed through for consideration before the next Finance Act, appeared at the end of February and recommended the repealing of all existing legislation and the taxing of a new and wide range of products which may or may not include proprietary foods describable as "confectionery . . . recommended, held out, or advertised in any way whatsoever . . . for the protection or maintenance of bodily health". Well, it is necessary to eat food in order to maintain bodily health and certain foods for their essential protective value. So where can such a recommendation begin or end? However, the fact that the Committee urges "consideration of the propriety of taxing foods, beverages, and other preparations widely advertised as possessing properties beneficial for health" is a sort of recommendation to mercy. We do not think proprietary foods should be taxed, and we do not think the Government will include them in the scope of the new Act.

Milk Reorganisation Commission

The spirited objection to the recommendations of the Milk Reorganisation Commission to which we have referred previously continues. This time the Minister of Agriculture has been confronted by a memorandum from the Central Landowners' Association which represents about 12,000 owners of agricultural land in England and Wales. Three-quarters of them are farmer-owners of large dairy herds. They object to the main recommendation to establish a Milk Commission which would rule supreme and have no appeal against its decisions. The chief argument is that the national importance of the milk supply is no reason for a form of outside control which would not be tolerated for one moment in other industries. With this view we cannot agree. We feel that the national supply of milk is of paramount importance. The nation must have its milk and at a reasonable price. We are weary of the continued bickerings between producers, retailers, and distributors, all of which react unfavourably on the consumer. Neither the Milk Marketing Board nor the National Farmers' Union have been able to make sense out of the milk problem. Farmers claim they have not received adequate remuneration, and yet consumers have had to pay such high prices for milk as to make it almost prohibitive. At the same time millions of gallons of milk have been sent to manufacture at ridiculous prices. The farmers have had their chance and failed. The nation must have its milk. The only solution we can see is an independent body such as that specified by the Commission.

Ministry of Food Foreshadowed

FOOD MANUFACTURE has for some time past stressed the need for adequate food defence measures as part of the general defence plans in the event of war. Very slowly, but, we trust, more surely than it seems, we are moving towards some form of planned control of food supplies. A supplementary estimate for the diminutive sum of £4,000 was recently introduced in the House of Commons by the Parliamentary Secretary of the Board of Trade as being needed for the Food (Defence Plans) Department. This department has the duty of preparing a defence plan for food control which could be put into operation on the outbreak of war and of forming a Ministry of Food if and when the Government decided to create one. Rationing will only be operated as part of a general scheme of food control, and the department is therefore framing machinery for controlling wholesale distribution of home-produced and imported supplies of important foodstuffs, in consultation with trade organisations, statutory bodies, market-

ing bodies, importers, wholesalers, and retailers. The main purpose of this food control is to ensure, in the event of a scarcity, that every section of the community shall receive its proper share; control of prices being an essential element under consideration. The department has recently secured the services of Mr. Adrian Lumley, who has been superintendent of the Torry Research Station at Aberdeen since it was instituted nine years ago under the D.S.I.R. Mr. Lumley took up his duties in London on March 1.

Sir William Beveridge's Scheme

We have been very interested in the three articles published in *The Times* last month in which Sir William Beveridge outlined some of his ideas on food control in time of national emergency. There can be no doubt that his experience at the Ministry of Food during the war of 1914-18 has placed Sir William in a strong position for formulating new proposals. One of the most interesting points made by Sir William in regard to food preparations was the need for more liquid milk consumption in peace time, because in this way we should increase our reserves of meat and fat which could be utilised as such in wartime. Of course, this would mean in actual wartime a gradual curtailment of the sources of milk. As each cow was turned to beef and fat a milk producing unit would be lost. Obviously, therefore, for this scheme to be really effective reserves of canned milk and dried milk should be built up. Sir William's task was to work out the details of a compulsory rationing scheme to be launched immediately war broke out under the direction of a Food Controller, and there is no doubt that a scheme of rationing would be not only advisable but necessary, yet the new Food Controller's job would be simplified and the nation's tribulations diminished by the presence of adequate stocks of storable food.

More Systematic Organisation

Following the articles by Sir William Beveridge the subject was further ventilated by another important personage who functioned during the last war. Lord Bledisloe, who was deputy Food Controller and Chairman of the Royal Commission on Sugar, has endorsed in glowing terms all that Sir William said. Indeed, he went further and regretted that at least the nucleus of the old Food Ministry has not been retained "while some, at least, of those who did its work are still alive". Lord Bledisloe stresses one or two important points. The first is the enormous advantage of local, or mutual, control over direct Government control. This was demonstrated by Lord Rhondda's experiment of delegating wartime rationing to local authorities. The second point made is the necessity for avoiding the very costly mistake of compelling the cultivation of wheat (and the destruction for this purpose of valuable old pastures) in areas or on soils which are unsuited to its production. He also urges the advisability, on the other hand, of increasing the normal output of such foods as pig meat, potatoes, and milk. With these suggestions we are in complete accord. We are not so sure that Lord Bledisloe is right, however, when he says that it would be dangerous myopia to discontinue assistance to sugar beet production. We feel that much more could be done in the way of storing a surplus of refined sugar. In any case, the nation's sugar requirements could never be completely met by home beet production, which would always have to be augmented by storage.

Food Storage is Imperative

The utterances of Sir William Beveridge and Lord Bledisloe are important and far reaching, but they are both conspicuous by a complete silence on the question of storage which, to our mind, is the real crux of the situation. We have given at length on several previous occasions the reasons why we think the building up of a reserve supply of foodstuffs would be the most formidable deterrent to an aggressor. The storage of wheat and other commodities has been dealt with by Mr. T. H. Fairbrother a year ago and the information we have published has, we know, been a valuable contribution to the problem under investigation.

Canned Food Storage Scheme

A little time ago we learned that a scheme for the accumulation of stores of canned foods had been submitted to the Food (Defence Plans) Department, but this is still awaiting a Cabinet decision before it can proceed further. The scheme, we understand, advocates increasing the canning of milk and fish, and to some extent meat, and the distribution of these reserves in the stores of canneries and in warehouses in centres of population. Special stores away from the danger of air attack may also be necessary. It submits that the maxi-

mum food value can be stored in cans without deterioration at a lower cost than would be entailed in storing grain or other commodities which can only be stored for limited lengths of time and must therefore be kept "flowing through" the store as through a reservoir.

Advantages of Canned Reserves

There are, of course, many advantages in creating a reserve of canned foods apart from the cost. Canned milk and fish represent a concentrated food of high nutritive and protective value. Canned foods cannot be affected by war gas. They are already cooked and can be eaten cold, out of the can if necessary. They are thus of real value under emergency conditions when baking bread and cooking of any description is out of the question. We do not quite understand, however, why vegetables should not be included in the scheme. Vegetables are more essential as protective foods, and we think a good proportion of canned vegetables should be included in any reserve supply. Of course, to do this it will be necessary to proceed with the scheme almost immediately, if indeed any surplus of canned vegetables could now be projected this year. Only fruits can safely be excluded from a scheme for which we earnestly hope a substantial expenditure will be sanctioned at a very early date.

The Canning Industry and Food Poisoning Cases

It is a very serious matter to throw suspicion on the products of a large and important industry without sufficient justification for it. It is still more serious when one considers the impression made on the minds of the consuming public who do not discriminate between one form of canned food or another, but tend to suspect all alike. Reports of cases of food poisoning appearing in the Press cannot help injuring the sale of not only the particular product in question but products of the canning industry as a whole. Sometimes we have noticed that reports appearing in the daily Press draw their information from the medical Press. Cases of food poisoning, for example, should quite rightly be the subjects of examination and report for publication by medical officers and practitioners, but we think it is time that members of the medical profession generally, and particularly those members who may have to investigate such cases, learned something about the subject of sterilisation as applied to processed foods and were able to draw logical conclusions from facts scientifically proved. In a recent case reported in the *British Medical Journal* canned mutton is blamed, so we have invited Mr. Macara, director of the British Food Manufacturers' Research Association, to examine the report and state his own conclusions, which we publish on page 130. Surely it is time the canning industry did something really properly to inform the medical profession. We would like to know what has become of the Memorandum it was proposed at the last Canning Convention should be sent out to all members of the medical profession, and, if it has been sent out, what has been the result? Has there been any response in the form of requests for further information?

Good Canning Publicity

A publication has recently been produced in France which cannot fail to impress the medical profession.

Le Fer-Blanc et les Conservés en France is an excellently produced book dealing with the canning and preserving of foods in France. In its 93 pages there are 48 complete pages of unusually fine illustrations which were taken especially for the book. They convey a remarkably clear idea of the great variety of processes and products used in the canning industry. The text deals with canned foods from the point of view of wholesomeness, and is intended primarily for dietitians and doctors. Amongst the subjects dealt with are the general methods of preserving foods, the nutritive value of canned foods, and in particular of condensed milks, the food regulations of France as they apply to canned foods, and a brief account of tinplate manufacture.

Many of our readers will find much of interest in this book, but a limited number of copies is available for free distribution in other countries besides France. Why do we not produce something like it in this country? It would be most impressive. Indeed, this book is a delight to read and possess. Application should be made direct to the International Tin Research and Development Council at Mansfield House, 378, Strand, London.

The Microbiology of Disinfectants

Among his counsels for the writing of good English, Mr. H. W. Fowler has included a caution against the employment of stale and hackneyed jokes such as the one about "snakes in Iceland". Nevertheless, that hackneyed phrase can seldom

be more appositely recalled than in an introduction to the study of the microbes that are carried and even invigorated by the very agents commonly employed to eliminate and kill micro-organisms. We do not propose to indulge here in a discussion as to the difference between disinfection and antisepsis; it is sufficiently remarkable that moist salt, strong brines, crude petroleum, phenols, the cresols, and naphthalene—which belong at least to the disinfectant class—have a bacteriology at all. One would expect that a description of the bacteriology of these substances would take up very little space, whereas a quite considerable literature has been written about the forms of life which they can support. Dr. Nicol's article in this issue mentions a selection of the experimental studies that have been made on micro-organisms tolerant of high concentrations of salt.

Not only bacteria and fungi have been found tolerant of the conditions in brine; the microscopic plants known as algæ were found by the earliest biological examination of salt. The brine lakes in the deep salt mines of Wieliczka sustain a varied population, including several species of unicellular animals.

The bacteriology of the phenols and coal-tar products is not altogether analogous to that of salt, for, while life can exist at the highest concentration of aqueous solutions of common salt, the coal-tar derivatives are infallibly lethal when concentrated. There is, however, another important distinction between salt and coal-tar isolates as bases for living organisms. A salt solution not being a source of energy, this requires to be supplied from outside if the microbial population of a salt solution is to increase in numbers. On the other hand, the coal-tar disinfectants, at suitably low but not vanishingly small concentrations, are actually utilisable as sources of energy by certain micro-organisms, which feed upon and break down those disinfectants in just the way that less specialised groups of bacteria decompose sugar to their profit.

These facts about the endless variety of life suggest caution in discussing biological problems; canning is, after all, an application of biology. It is, moreover, a particularly delicate matter to hold the scales between the aim of killing harmful organisms and the aim of satisfying the consumer —another organism—by supplying a product as unimpaired as possible in its biological values. The problem is not made to appear more simple by the knowledge that trusted disinfectants are themselves liable to contract a sort of bacterial disease; but—to end, as we began, with a cliché—forewarned is forearmed.

Copper in Tomato Puree

There seems to be an outcry about the quantity of copper in tomato purée and nobody appears to know what it should or should not be. Public analysts differ in their opinions. Some say the limit should be 10 parts per million; others would raise no objection to 50 parts in the million; whilst there is no official opinion. The copper may come from that naturally present in the tomatoes or from plant used in the manufacture of purée. The natural copper content varies with the source of the tomato. Canadian tomatoes contain about 0·5 part per million. Tomatoes of Continental origin may contain up to 2 parts per million, and from certain other sources even 5 parts per million may be reached. In a special communication dealing with the manufacture and examination of tomato purée published on page 116 a maximum of 15 parts per million is suggested. Surely this matter should receive consideration. Tin is allowed in foodstuffs up to 2 grains per lb. and arsenic up to 1·4 parts per million. Admittedly these are not statutory regulations, but they are accepted standards.

"Sugar Bud" Flavouring

The Toronto firm of Shirriffs, Ltd., now offer the housewife an extension of the flavour-carrying "sugar bud" idea to include not only their jelly crystals, but also blancmanges. The jelly crystals of this firm have been on the market in Canada for some time, and the popularity of the product is largely due to the unique method by which it is flavoured. The flavouring principle is a liquid encased in its own container of sugar crystals—the whole, in effect, resembling the liqueur chocolate. The incorporation of significant amounts of real fruit juice to flavour the highly moisture-sensitive mixture that jelly crystals represent is thus accomplished. Also, in the case of synthetic flavours, the method permits the laboratory-perfect mixture of aldehydes, etc., each with its different boiling point, to be transferred to the product with no intermediate loss or change that is inevitable if the flavour has to be dried into the product in the usual way. If any criticism is to be raised, it would seem to be in the very fact that there is little or no aroma to the product when the package is first opened. But this lack of what might be termed "nose appeal" might well be a disadvantage. "Fancy Free" Dessert is the name of the new product which was introduced for the first time in this country on the Canadian stand at the recent British Industries Fair at Olympia.

WATCH YOUR SALT!

by HUGH NICOL, Ph.D., F.I.C.
(Rothampsted Experimental Station, Harpenden, Herts.)

Salt is so widely used as preserving agent and mild antiseptic that it will probably surprise most readers to hear that salt has a bacteriology of its own. The following outline gives some practical aspects of the microbiology of salt, and may suggest clues for the solution of troubles due to discolorations of hitherto unsuspected origin.

IT HAS recently become recognised by canners that solid sugar can be a carrier of micro-organisms provoking spoilage. It is not so widely known that some kinds of solid salt carry bacteria and other micro-organisms capable of giving trouble to the food manufacturer, and that such organisms not only vegetate on the salt crystals, but can flourish in the strongest of brines.

The best-studied example of trouble caused on food by a bacterium able to grow in the presence of salt at very high concentrations is the red discoloration of salted cod and similar kinds of fish preserved and dried either on board ship or soon after landing. The discoloration of salted hides provides a closely related problem, differing mainly in not affecting a food product. Bacteria have also been reported on sausage casings, in canned brined fish, and on other salted goods. Salt has been implicated more or less clearly as the source of the organisms causing the discoloration of the salted product in many of these cases.

Algæ, yeasts and other fungi, and bacteria have been reported at various times in brines or on salt. Yellow and colourless bacteria have been found on salted foods or in brine, and an organism causing blackening in pickled cucumbers has been studied under the name of *Bacillus nigrificans* (1) in Michigan. Many of these halophilic organisms are presumably introduced on the foodstuffs themselves, or from the air (as was the yellow bacterium recorded by Ingram [2]), and are not salt-borne, nor do all of them tolerate very high concentrations of salt.

Salt as a Source of Contamination

The purpose of the present article is to draw attention to the possibility of salt itself being a source of contamination in food factories, and not to discuss in detail the considerable literature relating to microbial spoilage in salted products. It is therefore convenient to divide such spoilage into the two types: that which is salt-borne, and that which is caused not by, but in spite of, the presence of a high percentage of salt. This distinction enables us to leave out of consideration those spoilages arising from salt-tolerant organisms brought into the factory on the material to be processed, or as a result of air- or water-borne contamination. The distinction is made for reasons of convenience rather than logic, as will be realised when the processing of sea-fish is considered. Also, once a salt-tolerant organism has become established in the brining-rooms and vats the hygienic remedies to be adopted within the factory to dislodge the intruder will be, broadly speaking, the same, whatever its source; only the preventive methods will differ according to the origin of the contamination.

It is a curious fact that the organisms which are normally associated with the highest concentrations of salt have all been reported to confer a reddish or pinkish-red colour on the affected product.* However, bacteria that produce a colour when in pure culture in colonies on solid media will not necessarily impart colour to brine, in which they are less crowded; the production of colour by bacteria often increases with the age of the culture and with increasing density of bacterial growth.

Sources of Knowledge

The literature of the microbiology of salt itself (3, 4, 5 and 6) is small and some of it is not readily accessible. Our principal sources of knowledge concerning salt-borne micro-organisms are the papers of Bitting (7), Harrison and Kennedy (8), Stuart *et al.* (9), and Lochhead (10) on the red discolorations of salted fish and hides. These

* The converse—that red or pink discolorations are invariably due to organisms originating in common salt or tolerant towards high concentrations of salt—is not true. A familiar example of an organism causing red spots on starchy foods is the "miraculous bacillus" *Bacterium prodigiosum* (modern name, *Serratia marcescens*); this is not especially salt-tolerant. Red spots on cheese are relatively common, but seem not to be associated with salt; red organisms derived from saltpetre used for cheese-making have, however, been isolated by Harrison and colleagues. A red colour on the surface of butter has been shown to be due to the action of SO_2, from a leaky refrigerating machine, on artificial colouring matter added to the butter!

papers provide studies of highly salt-tolerant organisms, thought to have been derived from solar salt,* or, in the study of Bitting, from the sea-water of a harbour. These modern authors have devoted themselves chiefly to investigation of salt-tolerant bacteria—salt-tolerant algæ, moulds, and yeasts being given less attention, but the work of earlier authors is freely referred to in the four papers just cited.

Solar Salt

All samples of solar salt examined by the authors of these papers were found to be a probable cause of the spoilage manifesting itself as reddish colourings on the fish or hides, and in several instances it was clearly shown that the salt was indeed the carrier of the undesirable organisms. Highly salt-tolerant specific organisms were isolated from the salted goods or from the solar salt. Pure cultures of two such bacteria (*Serratia* [*Pseudomonas*] *salinaria* and *S. cutirubra*) have been received by the author from Dr. Lochhead and have been maintained on a medium containing a high percentage of sodium chloride. It is noteworthy that these bacteria, cultivated on Lochhead's medium "C" (of which the method of preparation is described at the end of this article), did not appear to make appreciable growth until the medium had perceptibly dried, so that the salt content was much higher than its nominal percentage of about 20; also, the bacteria continued to maintain colour and viability when crystals of salt were visible. This last observation accords with the habit of the highly salt-tolerant bacteria as described by Lochhead and others.

Miscellaneous floras have been found (4, 5) on dry creamery salt exposed to the atmosphere, but such flora are probably mainly dust-borne saprophytes, not characteristically tolerant of salts, having been enabled to live merely because the salt was too dry to affect the flora in the vegetative state. The truly salt-loving bacteria, such as the two species of organisms just mentioned, appear to require a saturated solution of salt for good growth.

To carry salt-tolerant organisms, solar salt need not be of recent oceanic origin; Stuart *et al.* have reported the presence of reddish salt-tolerant organisms in solar salt made from the Great Salt Lake of Utah. It would therefore seem that the highly salt-tolerant organisms, when they do not originate in the sea, may be of inland provenance, and may be soil organisms that have somehow developed a special tolerance for high concentrations of salt.

English (or Liverpool) Salt

English salt (known in Eastern Canada as Liverpool salt), like other mined salts similarly processed, seems to be free from chromogenic salt-tolerant organisms when it reaches the consumer. Granted that this is so, the possibility should not be overlooked that micro-organisms within the food factory may acquire a tolerance for salt.

* Solar salt is salt evaporated during exposure in lagoons to sun and atmospheric influences.

Toxicity

Regarding toxicity, there appears to be no real cause for alarm; in fact, Bitting noted that some of the workmen preferred for their own consumption fish that had assumed a slightly reddish tinge. Apart from some early citations (for example, the cases quoted by Mauriac of Bordeaux in 1886) of poisoning by reddened fish, no evidence is known to the author of any harm resulting from the ingestion of such food contaminated by the reddening organisms alone. In the early cases, the poisoning was almost certainly due to a secondary putrefaction and not to the activities of the genuinely salt-tolerant microbes. The heat-resistance of salt-tolerant organisms found in food has not been sufficiently studied to permit of generalisations concerning their viability at the higher temperatures (*cf.* [11]). Moderate warmth, however, favours their development and spread. In the North American salted-fish trade, the product becomes saleable with difficulty in the summer months—that is, as soon as the air temperature approaches 60° F. The red bacteria studied by Harrison and Kennedy and by Lochhead were strictly aerobic; on brined material the colour appeared only above the surface of the liquid. These bacteria did not survive a temperature of 70° C.

Precautions to be Observed

If bacterial infestation occurs in the brining plant or upon the salting floors, flushing with mains water may be relied upon to remove most of the growth, as the salt-tolerant bacteria are readily disintegrated by fresh water; after a good flushing with water, ordinary modes of disinfection should be adopted. Salt in stock should be examined for the presence of micro-organisms. The following outline for a technical bacteriological examination may be suggested. (Incubate at about 30° C. for some weeks.)

(1) Put a piece of fresh or salted cod or other fish with a little sea-salt in a tube and sterilise by autoclaving; add enough of the suspected salt to form an approximately saturated solution.

(2) Put an "inside" piece of fresh cod in a sterile covered vessel and add the suspected salt in excess, removing liquid if necessary.

(3) Make some sterile broth with one part of fresh or salted fish to two parts of water, the mixture being allowed to digest overnight, then filtered through cloth. After addition of 0·5 per cent. of peptone, add a little sea-salt, tube, and autoclave. Add to each tube a long strip of Whatman's No. 4 filter paper, separately sterilised dry. Add the suspected salt to saturation, and watch for development of colour on the paper.

Media 1 to 3 are after Harrison and Kennedy. A solid (agar) medium can be improvised similarly, or Lochhead's Medium C can be used: to prepare 1 litre, sterilise in four separate flasks (*a*) water (about a litre); (*b*) 500 ml. of fresh skim milk; (*c*) 15 gm. of agar in 200 ml. of water; (*d*) a weighed amount of salt depending on the final concentration desired. The contents are mixed immediately after removal from the autoclave by adding (*b*) to (*c*) and that mixture in turn to (*d*). Enough hot water is added gradually with shaking to

make a final volume of 1 litre. When the salt is dissolved, the hot medium is poured into Petri dishes (or tubes for slanting) and when hard is ready for use. Some salting-out is to be expected during preparation, but practice will improve the smoothness of the product.

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Schoop, G., "Obligat halophile Mikroben," *Zbl. Bakt.*, Abt. I, 1935, **134**, 14-26. The following may be quoted from the abstract in *Zbl. Bakt.*, Abt. II, 1935-6, **93**, 59: "Die Bedeutung der obligat halophilen Mikroben liegt in dem Vorkommen in Lebensmitteln. Sie scheinen gewisse Aufgaben bei der Reifung der Salzkonserven zu haben, sie wurden jedoch in Fällen beobachtet, in denen die befallenen Nahrungsmittel als verdorben zu betrachten waren".

On the question of aroma production by bacteria associated with brined herrings a series of papers has appeared in the Moscow journal *Voprosy Pitania* (*Problems of Nutrition*), 1934, No. 3, abstracted in *Zbl. Bakt.*, Abt. II, 1935, **92**, 389-90.

According to the *World List of Scientific Periodicals*, no volume published before 1924 of the *Transactions of the Royal Society of Canada* is available in libraries in Great Britain and Ireland except for an imperfect file in an Aberystwyth library. By the kindness of Dr. Lochhead, the author has been given a reprint of Harrison and Kennedy's paper—possibly the only accessible copy in the country.

AMERICAN CANNERS' CONVENTION

FROM the character of the addresses delivered before the various sessions at the annual meeting of the American National Canners' Association, which was held recently at Chicago, it was apparent that American canners realise that they are in the midst of an era of changing conditions. They are faced with the important questions of new legislation, new trade practices, new labelling trends, new relations with growers, and new marketing developments.

An extensive display of new labels adopted recently by progressive canners drew attention to the spread of descriptive labelling. Skilful designs had enabled a considerable amount of descriptive matter to be added to these labels without destroying the poster effect.

The spectre of growing disaster in the Mississippi and Ohio valleys at the time of the convention interrupted the trade and legislative deliberations. Some canners were absent; others found it necessary to leave to look after their business interests; and others used the telephone and telegraph to order goods to be shifted from low to high ground in a desperate effort to save their stocks from water damage. The attendance throughout the week was, however, good, and was estimated at 20,000.*

Mr. Ralph O. Dulany, a member of John H. Dulany and Son, Fruitland, Ltd., whose photograph appears in our Trade Notes and News section, was elected president, and Karl Kuner Mayer, of the Kuner-Kempson Co., was elected first vice-president of the Association.

* This is in striking contrast to the number of people who attend the Canning Conventions held in this country.

NEW FRENCH MEAT CAN

A NEW patented can for the canning of *pâté de foie* and similar preparations, but which can also be used for hams or tinned meats generally, is being introduced by Olida, the French canners. The can is designed more especially for the larger sizes, which would be suitable for retailers who open the can and sell the contents retail. Consumers may, however, be interested in it in smaller sizes.

The can is provided with two parallel faces for the top and for the bottom, the other four faces being inclined. As seen in the illustration on page 127, the can is opened by removing a strip which runs round the base of the can, using a key.

The feature of the can is that the strip removed leaves the contents standing on the base of the can as a base without any projecting edge. In this way the contents can be left in position and cut off in slices for retail sale.

It is interesting to note in connection with this firm that they have recently granted a licence for their ham-curing process to Messrs. Malet, Ltd., of London, who are now producing ham in England by the Olida formula under the name of "Telam".

CANNED SMOKED FISH

The Relationship of Shrinkage to Canning Quality.

By
Dr. D. J. TILGNER
(*of Warsaw*).

Smoked Sprats. I, Oversmoked—78 per cent. yield; II, Undersmoked—75 per cent. yield; III, Canning—65 per cent. yield.

IN SOME countries a considerable amount of smoked fish is being canned. Canned kippers and canned sprats are good examples of this kind of product. Owing to the growing competition among the numerous producers, the problem of quality and selling price of the smoked fish deserves close attention.

Smoking is partly a drying process, in which the moisture in the product is extracted by a warm or cool air draught. If the smoked product has to fulfil the quality requirements expected by the market and also if adequate keeping qualities are to be imparted to the fish, it is necessary to shrink and dry the product to a certain extent. Unfortunately, there prevails always the tendency of some producers to reduce the shrinkage of the fish during the smoking process in order to obtain a higher yield and hence a large gross return. I have seen on the Continent bucklings smoked to a glossy golden colour, but only so slightly dried out that, after being packed, the free juice had to be poured out of the boxes before nailing them.

In the manufacture of kippers shrinkage in the past has amounted to at least 20 per cent., while at present a loss to the extent of less than 10 per cent. of its split weight seems to be quite common. This difference is perhaps partly due to the changing food habits of the consumer, who requires at present a product more juicy but at the same time flatter in taste. But the main reason seems to be found in the strong competition among the smoke houses, whereby those having a lower shrinkage in their smoked products obtain an additional premium over their competitors adhering to the time-proved method of producing a well-smoked fish. A synthetic dye is used instead to give a golden colour to the fish and to reduce the time of smoking. This, however, is not necessary if smoking is properly carried out. I think also that the present undesirable status of under-smoking and subsequent dyeing of the fish is partly the result of lack of interest on the part of those who should look after fair production and trade methods.

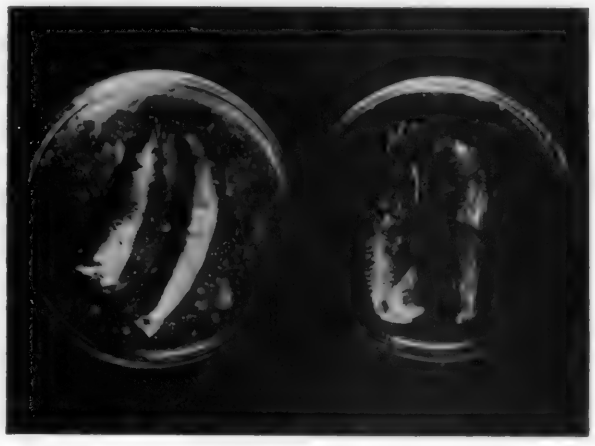
Smoked Fish for Canning

A strong emphasis should be put upon the necessity to differentiate smoked fish for the fresh market from fish used for canning. Taking sprats as an example, according to our investigation the former should have a yield of no more than 70 to 75 per cent. after being smoked, whereas sprats for canning should be dried and smoked to a yield of 60 to 65 per cent.

Smoked fish are usually canned with the addition of oil. The latter should show in the can an almost clear and translucent appearance. If the smoked fish is canned in an under-smoked—*i.e.*, "wet" stage—the excessive moisture in the fish spoils invariably the appearance of the oil, which becomes a turbid and watery emulsion. Similar observations will presumably apply to canned sardines and other canned smoked or partly dried fish. In Poland only sprats are being canned, and the observations are therefore limited only to this product.

All our investigations proved that the influence of the smoking and drying process is of vital importance to the appearance of the finished canned product. A summary of the data is given in the following table:

Sprats in Oil.	*Well Smoked.*	*Undersmoked.*
Smoking yield	64·9 per cent.	74·1 per cent.
Fat content direct	11·03 per cent.	13·1 per cent.
Fat content in dry matter	31·4 per cent.	36·3 per cent.
Dry matter	64·9 per cent.	62·6 per cent.
Net weight in full can ...	154 grm.	157 grm.
Difference in the inweight of fish after canning ...	+ 5 grm.	− 6 grm.
Appearance of oil	Almost clear and translucent	Very turbid and watery



Oil from different cans. (1) Very turbid and watery (left) from wet sprats. (2) Almost clear and translucent from well-dried sprats.

Determination of Smoking Yield

For general plant procedure the determination of the smoking yield should be as simple as possible. Using the laborious chemical analysis only as a comparison in our experimental investigations,* we introduced a practical method for the determination of the shrinkage in smoked fish by counting the number of individuals per 1 kg. of smoked sprats. For larger-sized fish the weight of the standard sample should be increased accordingly.

In spite of the large seasonal difference in the fat content of sprats and similar species, the average body weight remains almost unchanged. Fresh sprats from the Gdynia Gulf used for smoking and canning show a decrease in the fat content from 14·1 per cent. in December to 3·6 per cent. in June, and a corresponding increase in the water content. This fact permitted us to suggest for use in the smoked sprat trade the following simple formula:

$$\frac{\text{Number of individuals in 1 kg. of fresh sprats} \times 100}{\text{Number of individuals in 1 kg. of smoked sprats}} = \text{per cent. yield.}$$

* D. J. Tilgner, *Polish Agric. and Forest Annual*, xxxvii., 3, Poznań, 1936.

COMPARISON OF YIELD BY NUMBER/KG. AND CHEMICAL ANALYSIS OF SMOKED SPRATS.

Number kg.		*Per Cent. Yield by—*		*Fresh.*		*Smoked.*	
Fresh.	*Smoked.*	*Num./kg.*	*Chem. Analysis.*	*H_2O.*	*Fat.*	*H_2O.*	*Fat.*
102	146	69·5	68·9	72·2	11·5	62·3	14·0
86	156	55·4	53·2	75·8	10·1	61·4	12·1
101	150	67·3	67·4	73·3	10·8	62·3	14·1
101	153	65·5	63·6	74·2	9·5	61·1	13·2
96	146	65·7	64·2	73·2	11·2	59·4	16·3
96	156	62·8	62·1	75·0	9·3	60·8	13·9

A comparison of yields as determined by the method of counting the number of individuals per 1 kg. and by the chemical analysis of the smoked fish shows only slight differences, which are negligible for the general plant routine work.

In the canning of quality products especially for export production, in which some countries possess rigid quality requirements, the problem of excessive yield of the raw smoked product deserves constant attention.

Smoked Fish for the Market

As mentioned at the beginning, the yield in the smoking process influences not only the calculation and profit margin of the manufacture but also the quality, and hence the consumption of smoked fish. It should be regarded, therefore, as a general problem of all those interested in the development of the fish products industry.

If competition in the marketing of smoked fish is to be met on a sound basis, due attention must be paid to the shrinkage during the smoking process. The results of our investigation showed, for instance, that sprats used for the fresh market and counting in the raw state 100 individuals per 1 kg. should contain 133-143 individuals if the product is to be smoked to a shrinkage of 25-30 per cent., which we consider both a desirable and liberal limit. Similar data for other fish would be of value to the industry.

REGULATING PLANT GROWTH

A CLEARLY written review of recent work on plant hormones or growth substances is provided by Tincker in the *Journal of the Royal Horticultural Society* (1936, **61**, 380-388, including a good list of references). After a brief historical review the production of hormones by plants and animals, tests (on plants) of preparations, some facts regarding chemical constitution, and the ways in which some plants react to applications of growth-regulating substances, are considered. The ester, methyl β-indole-acetate, has been shown to be more effective in accelerating growth than is the natural substance known as hetero-auxin, and Dr. Tincker remarks that the limit of effectiveness may not yet have been reached. Various synthetic compounds of the indole-acetic type have been successfully used in horticultural practice (*cf.* The MANUFACTURING CHEMIST, 1936, **7**, No. 6, 206-7). Unlike dyestuffs and intermediates, the new growth-regulating substances are not hedged about by patent protection.

SULPHURYL CHLORIDE in GREEN-FODDER PRESERVATION

THE A.I.V. method for preservation of green fodder developed in the laboratories of the Finnish Co-operative Butter Export Association originally employed a mixture of hydrochloric and sulphuric acids. It has recently been found that satisfactory results are also obtained by employing sulphuryl chloride mixed with water. The solution prevents decomposition of fodder rich in protein and comparatively poor in sugar.

TOMATO PURÉE

A special communication reviewing present methods of preparing Tomato Purée, with particular reference to the copper content of the finished product.

THE QUANTITY of tomato purée manufactured in different countries in the world has increased very appreciably with the increase in popularity of sweet sauces and chutneys, although a considerable proportion of tomato sauces are manufactured straight from the tomatoes without previous conversion into purée. The principal countries from which tomato purée or pulp is obtained are the United States of America, Italy, Canada, France, Spain and Hungary, and there is considerable difference in texture between the purée made in most of these countries. Speaking generally, continental purées are more fibrous, and therefore thicker than American and Canadian purées, which are sweeter and contain less fibrous matter. It is a very debatable point as to which is the better purée, and in this connection the writer can recall two American representatives in this country who were both anxious to sell their tomato purée for sauce manufacture. One claimed that his purée was the best "because it consisted of all juice and no fibre", whereas the other, representing a firm manufacturing on the other coast, claimed that his was the "finest purée obtainable as it contained all fibre and no juice". The fact remains, however, that there can be extremely wide differences in tomato purée, and buyers of this product usually very wisely buy on sample.

Quite apart from such conditions as differences in climate, season, soil composition, etc., which, in themselves, may be responsible for considerable variation in quality and type, we have the fact that certain canners of tomato purée use the so-called "plum" tomatoes, whereas others use the Franchesi type, which is the one commonly grown in this country. Plum tomatoes are grown principally in Northern Italy and in the South of France, and, as the name suggests, they resemble a plum in shape. They are far more "fleshy" in character than Franchesi tomatoes, and therefore produce a pulp which is more fibrous and thick. The process of manufacturing tomato purée is basically very similar in all countries, but the details vary greatly in different parts of the world.

Preparation of Tomato Purée

The tomatoes (whether plum or Franchesi) are usually grown in the vicinity of the cannery under contract, the canner providing the seed and guaranteeing a minimum price. In this way the packer can not only choose the seed which he considers produces the most suitable crop, but he can also have a hand in the arrangements for growing, so that up to a point he can spread the deliveries evenly over the season. Tomatoes intended for converting into purée should be uniformly well ripened, and purée manufacture should not be regarded as a process which is suited to utilise the trimmings and culls from the canning of whole tomatoes. They should be dealt with the same day as they are picked, since tomatoes in ripe condition quickly develop moulds, which may later be the cause of spoilage.

Washing and Crushing

After weighing, each consignment is washed, either by hand or in continuous washers built for the purpose. In these washing machines the tomatoes receive treatment in hot water, steam and cold water. From there they pass to a roller crusher, which frees the juice from the skins, cores and seeds. In some factories the pulp is sieved immediately after being crushed by means of a machine very similar to the fruit-pulping machines used in this country by jam manufacturers. In recent years, however, since the establishment of the importance of pectin in the stability of tomato sauces, an additional process has been introduced in many factories. This consists of heating the crushed pulp for a period of 5 to 10 minutes at a temperature of about 80° C. In this way the pectin which is present in relatively large quantities in the seeds and core is brought into solution. Following this the pulp is sieved in the usual way, and we have the tomato separated into two parts, one consisting of the juice and cellular tissue, and the other consisting of the skins, cores and seeds.

Concentration

The raw juice at this stage contains some 7 per cent. solids and it is quite fluid. The next step is concentration, and although up to a few years ago many factories were still using the open pan method, whereby the pulp was concentrated at atmospheric temperature, there are very few of these plants in operation to-day. The open pan method has been superseded by vacuum pans, in which the evaporation is carried out at temperatures which do not injure the colour or flavour.

The type of pan used is similar to milk evaporation plant, although in actual working the temperature of evaporation is usually somewhat higher than is the case with milk, temperatures of 150° F. being quite common. Naturally the lower the temperature and higher the vacuum, the better the quality of the purée that is produced, and efficient control of the vacuum pans is possibly one way in which the Americans have advanced more than the continental packers. Some packers still continue the old

practice of adding a small amount of salt, and where this is still being done the salt is usually added at the time of the introduction of the pulp into the vacuum pan. Some pulps are very troublesome on account of their tendency to froth, but this may be almost entirely overcome by the use of a small amount of edible nut oil.

Controlling Degree of Concentration

There is a certain difficulty in deciding when the evaporation has proceeded far enough, and in some factories the degree of concentration is judged solely by visual inspection of a sample. Obviously such a method is inaccurate and may, in fact, make all the difference between a firm ultimately making a profit or a loss, since 1 or 2 per cent. difference in the percentage of solids in the purée will mean a considerable reduction in yield. The ordinary laboratory method of testing the concentration of purées—namely, by drying out the moisture from a weighed sample in an oven—is impossible, since it takes too long, and various alternative methods have been devised which depend on the measurement of viscosity, refractivity, specific gravity, etc. It is probably correct to say that none of these are entirely satisfactory, but on account of the economic importance of following the concentration process with reasonable accuracy, one or two of these methods will be described.

(1) *Viscosity Methods.*—The ordinary viscometer cannot be used for tomato purée on account of the thickness and the presence of the fibre. Moderate accuracy, however, is attained by filling a long length of glass tube about $\frac{3}{8}$-inch diameter with purée, and taking the time of fall of a small steel ball to pass through a certain distance—usually 3 feet. The method is empirical, but when a standard time has been fixed the method is capable of considerably more accurate results than by visual inspection.

(2) *Refractometric Methods.*—The fact that the soluble solids of tomato purée are capable of deflecting the rays of polarised light to an extent depending on the amount present, has led American workers to prepare lengthy tables showing the refractometer readings for tomato purées of various concentrations. By simply placing a spot of purée on the prism of a suitable refractometer the refractive index may be read off immediately, and from the tables mentioned above the corresponding percentage of solids may be determined. Considerable accuracy is possible by this method, but its chief advantage lies in the speed with which the readings may be taken.

(3) *Specific Gravity Methods.*—The ordinary specific gravity bottle is difficult to use with tomato purée and the weighing is tedious. An instrument has been devised in Italy which is very simple to use. It resembles closely an ordinary hydrometer, but it has a section with ground glass joints which is filled completely with a sample of the purée. It is then placed in a cylinder of water and it sinks to a level depending on the weight of the purée. Since the volume of purée is always the same, the degree to which it sinks in a cylinder of water depends solely on the specific gravity of the purée. An arbitrary scale is usually engraved on the stem, and this may be calibrated against purée of known percentage of solids.

When the desired concentration has been reached, as judged by one of the above methods, the purée is filled into cans, which are given sufficient exhaust to bring the temperature up to 160° F. The lids are then spun on.

On the Continent, generally speaking, a heavier process is given to tomato purée than in the United States. For gallon tins the processing is often carried out at 220° F. for 1¼ hours, but provided that the pulp is reasonably clean, the time and temperature can be reduced considerably. The main point is to give sufficient time for the heat to penetrate to the centre of the can, and provided that the pulp has been sealed in cans at a temperature of 160° F. or above, the pulp, containing up to 18 per cent. solids, can be satisfactorily sterilised by taking 45 minutes to bring to 190° F., and subsequently holding at 205° F. for 20 minutes. In this way the colour and flavour of the purée are preserved.

Examination of Tomato Purée

Apart from flavour, from the buyer's point of view, the main consideration is the degree of concentration and the liability to losses. The former is usually expressed as percentage of solids, as determined by drying a small laboratory sample in the usual way. The percentage of solids is the only safe basis on which to judge concentration, and such terms as "double concentrated", "extra concentrated", "treble concentrated", etc., are really meaningless. It is surprising often to find very considerable variation in the amount of solids present, even in the same consignment of purée. This shows lack of control during the evaporation process, and undue variations in this respect may cause serious variation of the finished product in manufacturing sauces.

The only reliable method of determining the susceptibility to losses from fermentation or other spoilage is to incubate representative samples in a room at 37° C. This gives reliable information as to the sterility of the pack, but considerable insight into the question may be obtained by microscopic examination. In the U.S.A. standards have been laid down for the maximum numbers of moulds, spores and bacteria which are permitted. Counts are made in suitable dilutions in water, using a Thoma-Zeiss cell which is similar to a blood-counting cell. By making these counts it is easily possible to judge the type of raw material from which the purée has been manufactured. If unclean material has been used and very high counts are obtained, the probability of losses occurring is very considerably increased.

Copper

Within recent years much has been heard of the presence of copper in tomato purée, and several cases have been recorded in which the distributors of tomato products, such as tomato ketchup, have been brought before a court for offering for sale a product containing amounts of copper of the order of 0·2 grain per pound or 30 parts per million. It will be obvious that the copper content of

tomato products can only be traced to two sources: it may be derived from the copper which is naturally present in tomatoes in varying degree, or it may be due to copper dissolved from the plant used in the manufacture. Therefore, before talking too freely about the excessive amounts of copper in tomato products, the amounts which may be derived from natural sources (over which manufacturers have no control whatever) should first be established.

The difference between this figure and the amount present in tomato purée or other products is the only portion over which the manufacturer has control. According to the Chief Medical Officer of Health (Annual Report, 1934) tomatoes themselves may contain up to 5 parts per million of copper which occurs naturally, and considering that most of the purée which is imported into this country is concentrated to at least one-third of its original bulk, up to 15 parts per million of copper in tomato purée may be considered to be derived from natural sources. According to the same authority, 15-40 parts per million of copper are commonly present in tomato purée, and this figure can be confirmed from many sources. In fairness to manufacturers the maximum margin of 15 parts per million should be allowable as being within the range of natural copper, whilst anything in excess of this must be looked upon as contamination from the plant.

Copper as an industrial contaminant of foodstuffs has been investigated in America, and it has been established that although there is a large variation in the amount of copper resulting from contamination with copper plant during the process of manufacture, if this plant is adequately coated with tin, and if the plant is kept in clean condition when not in use, the amount of copper dissolved is extremely small. Actual factory tests performed under such conditions have been carried out, and the copper content was only increased by 8 parts per million; allowing the maximum for natural copper, this would account for 23 parts per million in the finished product. It is always a difficult matter to arrive at a standard, but in the writer's opinion something of the order of 25 parts per million should be considered as satisfactory, and would indicate that the manufacturing operation had been carried out with due care and precautions.

The Medical Officer of Health finds it disquieting that the amount of copper present in most tomato purées approximates to those amounts which were commonly used to colour peas and other preserved vegetables up till 1925; but in considering questions relating to the presence of toxic metals in foods, surely the quantities of the particular food in question, which are commonly eaten at one time, should be taken into account. The bulk of the tomato purée coming into the country is probably used as a base for sauces, and it may be present in such products in a proportion representing 50 per cent. Now the amount of sauce used by any individual in a day is relatively small, and if purée containing 25 parts per million of copper were used to make a sauce, it has been calculated that only 0·02 milligram of copper could possibly be consumed. The same amount of copper in canned vegetables would, owing to the fact that considerably greater quantities are consumed per meal, on the same basis give a maximum amount of 8 milligrams of copper consumed, or about 40 times as much as from sauce prepared from purée containing 25 parts per million of copper. The question of copper in tomato products, therefore, has not nearly the same significance as it had in green vegetables. At the same time, if a standard could be fixed for tomato products which would leave the average manufacturer who uses tinned or nickel-plated copper plant free to continue as at present, but which made it necessary for those manufacturers who use copper plant carelessly to improve their methods, it should be welcomed by all manufacturers in this country who use tomato purée as a basis for their products. On the basis of the foregoing a standard of 25 parts per million would meet the case.

RESEARCH WORK at the COLLEGE of the PHARMACEUTICAL SOCIETY

THE Annual Report for 1936 of Research Work at the College of the Pharmaceutical Society reveals that the following work has been done in the Nutrition Department.

Increase in weight of guinea-pigs has been shown to be dependent on the amount of vitamin C given when all other substances known to be necessary are given in liberal amounts. A sample of fruit juice was found to contain 6 International Units of vitamin C per gramme, as estimated by the increase in weight, and 8 International Units, as estimated by the severity of scurvy developed, which was considered fairly good agreement. The "tooth" method is thought to be preferable to the "increase in weight" method.

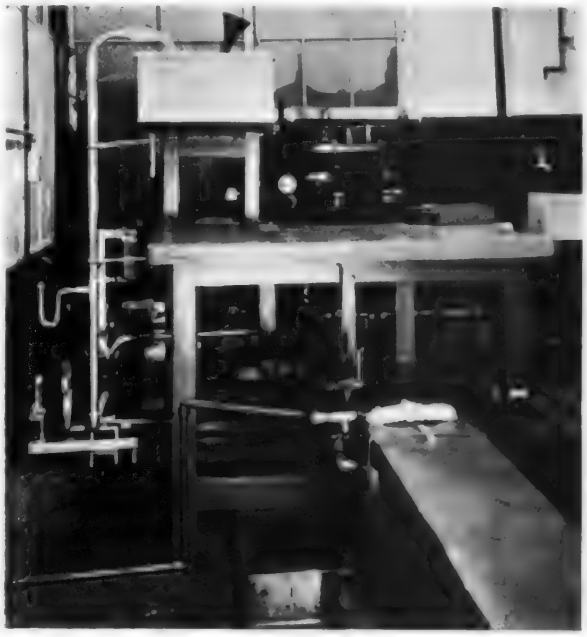
Experiments with regard to the absorption of vitamin A in the rat's intestine led to the conclusion that there was no difference in the rat's power of utilisation of carotene and vitamin A from different media, at least as far as can be judged from the media, cod liver oil and plant tissues or butters and margarines.

In the "increase in weight" method (of rats) of determining vitamin A, it was found that the greatest accuracy was obtained when the specified period of the test was counted as starting on the day that the first dose of vitamin A was given!

Further work with the International Standard for vitamin B_1 and the determination of the vitamin B_1 potency of different substances in terms of the International Standard, have shown that the increase in accuracy obtained by carrying on a test for longer than two weeks is seldom worth the extra labour involved.

Values were obtained for the vitamin D potency of different samples of cod liver oil during the past three years.

INTERNAL LACQUERING of CANS



REVOLUTIONARY ADVANCE BY A PHYSICO-CHEMICAL PROCESS — ELECTROPHORESIS.

By WILLIAM CLAYTON, D.Sc., F.I.C.
Chief Chemist, Crosse & Blackwell, Ltd.

View of experimental plant for the electrodeposition of lacquer in cans at the rate of 30 per minute, showing the electrode table, emulsion feed tank and the beginning of air-drying tunnel.

"*Lacquered cans are more prone to form hydrogen swells and to become perforated than plain cans. The seat of corrosion in lacquered cans is mainly at the seams (particularly the side seam, where the lacquer becomes scorched in soldering) and at the corrugations on the ends formed by stamping. It also occurs at scratches and pin-holes that have penetrated through both the lacquer and the tin to the underlying steel. . . .*"

So write Morris and Bryan in their recent "Second Report on the Corrosion of the Tinplate Container by Food Products." No doubt that briefly sums up the experience of most canners.

Endeavours to avoid mechanical maltreatment of the lacquer consequent upon forming cans from lacquered sheets have led other investigators to interesting tests on single—and double—spraying of lacquer inside the cans. The results, though providing an improvement on the orthodox technique, are still not perfect. What is required is a means of lacquering the interior of the can *after* fabrication with no damage by scratching or abrasion, the lacquer film to be homogeneous and filling all capillaries and interstices.

The present writer believed that electrodeposition of lacquer from an emulsion would yield the desired result, and the idea has been worked out by his colleagues, Dr. C. G. Sumner (Physical Chemist) and Mr. R. I. Johnson (Chemical Engineer), to a very satisfactory conclusion. A semi-works scale apparatus was designed and built, valuable assistance being given by engineering colleagues, especially Mr. E. W. Hemingway. Preliminary work by another member of the Research Department, Mr. J. F. Morse (Physical Chemist), concerned the preparation, stabilisation and degree of dispersion of the lacquer emulsions. The development of the scheme to a successful issue is indeed a splendid example of good team-work.

Electric Charge

The principle involved in the new process is the electrophoresis (unidirectional wandering) of lacquer globules when an electric current is passed through an emulsion of lacquer-in-water. Theoretically it would be possible to have two kinds of lacquer-in-water emulsion, depending on whether the dispersed globules were negatively or positively charged. (Charge reversal is possible by suitable ionic environment in the aqueous phase.) In practice, the globules are negatively charged, since deposition at the anode is required for optimum results. (For instance, deposition at the cathode suffers interference from gas evolution.)

The electric charge on the lacquer globules is a consequence of the fine subdivision of the lacquer, dispersed in water of alkaline reaction, whereby the globules adsorb hydroxyl ions (negatively charged). If now two electrodes be placed in the emulsion and an electric circuit be completed, the lacquer globules migrate to the + electrode (anode) and there become discharged. An adherent uncharged film of wet lacquer rapidly builds up, so tenaciously held that it can be washed with a water-spray under considerable pressure. The anode may now be dried by means of warm air and then stoved in the usual way. The result is the orthodox lacquer film familiar to canners, but with unusual properties such as enhanced resistance to corrosion and ability to prevent sulphur staining.

The Can as Anode

Applying the above principles to the internal lacquering of cans the simple process is to pour lacquer emulsion into the can which is the anode in the electric circuit and then introduce an electrode (cathode) such as a rod, which of course must not make contact with the can itself. A small current is passed for about six seconds. Many cans may be simultaneously or successively treated and machines may be built to handle up to 200 cans per minute. After the electrical treatment, the cathode is automatically withdrawn and the residual emulsion emptied out of the can and returned to the main feed reservoir. The washings drained from the water-spray treatment of the lacquer film are centrifuged and the concentrated cream emulsion collected for re-use.

Important Factors

The thickness of the film of lacquer so built up on the anode is a function of:

(*a*) The concentration of lacquer in the emulsion.
(*b*) The current density.
(*c*) The duration of electrical treatment.
(*d*) The grain-size or size-frequency analysis of the emulsion.

The emulsifying agent probably is an additional factor, especially if a solid powder is present. However, in view of the subsequent necessary stoving operation, ammonia is preferred because of its complete volatility and non-interference with the final film.

Comparative tests of films prepared from the same lacquer, applied as usual by rollers and also from emulsion by electrophoresis, indicate a marked superiority of the latter in respect of its homogeneity and its adhesion to metal. It is possible that electrophoresis affects the molecular orientation of the lacquer molecules at the tinplate surface, a factor now being closely studied in the laboratory.

Whilst any of the ordinary lacquer recipes may be employed successfully in electrophoresis, it is theoretically possible to formulate special lacquer recipes in relation to the molecular structure thereof and their particular behaviour in an electric field. It would be premature at this stage to indicate the very interesting results secured in this connection. Suffice it to state that the electrical process has greatly broadened the whole outlook of the problem of lacquering cans.

Naturally, the process can be readily applied to the simultaneous lacquering of both the interior and exterior of the can, or simply of the tinplate sheets themselves. In the latter case, whilst a much better film than usual results, there would be the scorching of the side seam in soldering.

Lids may either be stamped out of electrically lacquered sheets or may be independently lacquered in a special apparatus designed for this purpose.

The process has been widely protected by patents in Great Britain and abroad, the first British Patent granted being No. 455,810 (1936), where full details of the necessary apparatus are described. The electrophoresis scheme is one of several advances from this laboratory dealing with different aspects of making and using cans for foodstuffs. It is still in its infancy, but already, during nearly two years' tests, it gives remarkable promise of wide utility.

CANNED ORMERS

A SHELLFISH seldom encountered in our waters and whose occurrence is restricted to somewhat widely separated localities is the ormer (*Haliotis tuberculata*). Defined as a gastropod mollusc, the animal is found at low tide on rocks, to which it adheres with even greater tenacity than the familiar limpet. Its shell, which rather resembles a human ear in shape, gives it another local name of ear-shell or ear-fish.

In the Channel Islands, which with the coasts of France are the nearest localities of the ormer's occurrence to England, it is considered a great delicacy. On the largest of the islands, that of Jersey, an enterprising firm has been experimenting with the commercial canning of this shellfish and has succeeded in evolving a very satisfactory cooked pack of them. One difficulty which remains to be overcome is the maintenance of a steady, adequate source of supply. In times gone by the mollusc was abundant on those shores, as also was the oyster, and at spring-tides during the autumn, winter, and spring months of the year they were obtainable in large quantities. Uncontrolled fishing, unfortunately, has levied its inevitable toll, and supplies are now very scant. Just how scant they are may be judged from the fact that the factory reports that not only is it unable to meet even the local demands of the island's population of about 60,000, but that economic production of the pack cannot be organised.

Although legislation enacted by the States of Jersey has imposed an "open" season of about six days in the entire year during which the ormer may be gathered, it is doubtful whether this will prove remedy enough for past prodigality to permit of its reappearance in significant numbers for a number of years hence.

On the western coast of the North American Continent, the ormer, or, as it is called there, the abalone, is well known. The greatest quantities occur off the coast of California, where half a dozen different species that are used commercially are found, and it is estimated that something like two million pounds are marketed annually by that state. But one or two species occur off the coasts of British Columbia and Alaska, and their gathering or marketing does not appear to have been organised to any great extent. According to the Dominion Pacific Biological Station at Nanaimo, B.C., Canada marketed abalones to the value, in 1930, of $3,500 (about £700), and in 1931 of $4,500 (about £900), of which almost the entire amount went to Japan. Since 1931, however, there appears to have been no further record kept of either production or marketing.

MARGARINE—CHOCOLATE FAT BLOOM—COLOUR OF COOKED POTATOES

THREE FOOD GROUP PAPERS

THE MEETINGS of the Food Group of the Society of Chemical Industry attract interesting papers and large audiences, and the meeting held at the Institute of Chemistry on March 10 was no exception. Dr. Franklyn Kidd, Chairman of the Group, presided.

Science and Margarine

Mr. P. N. Williams commenced his paper by saying that margarine to-day occupied a very important position as a national food product. The British Medical Association's publication, *Family Meals and Catering*, left no doubt as to the food value of margarine on a calorific basis. The results of digestibility tests had shown that margarine was digested to the extent of 96 to 99 per cent. In addition, research throughout the world had shown that both margarine and the fats used in making it were almost completely used by the body.

Vitaminised margarine was placed on the market for the first time ten years ago, whilst to-day the great bulk of margarine—in Great Britain at least—was adequately vitaminised in respect of vitamins A and D. Such margarines were thus a valuable source of fat-soluble vitamins A and D. As to the palatability of margarine, Mr. Williams said that in the judgment of most dieticians the full utilisation of a foodstuff was only attained when it was palatable to the consumer, and experience showed that fresh, well-prepared margarines and butters were equally palatable.

Chocolate Fat Bloom

Dr. William Clayton, Chief Chemist of Crosse and Blackwell, then read a paper entitled "Physico-Chemical Investigations Incidental to the Study of Chocolate Fat Bloom". This was a joint contribution with Messrs. Sydney Back, Robert Ian Johnson, and James Frederick Morse, and the first part of a series of papers on their research into this subject.

Fat bloom, said Dr. Clayton, was a consequence of the fractional crystallisation of the higher-melting fractions of the cacao-butter medium. Its incidence was minimised by mechanical treatment of the chocolate during its preparation, which induced seeding of fat crystals, and their intimate incorporation in the moving mass in the conche, the tempering apparatus, and in the covering technique.

The authors believed that conching resulted in a possible partial oxidation of cacao-butter. Depending on the degree of oxidation and polymerisation, products were obtained with optimum effect on the mobility of chocolate or on the inhibition of fat bloom. Again, it was possible by the addition of 0·25 per cent. of such material to olive oil to prevent stearin deposition from chilled oil 2° C. for years.

These effects were ascribed to adsorption-orientation phenomena at the two interfaces in chocolate: fat cacao particles and fat-hydrophilic particles (sugar and milk powder), and, in the olive oil, at the fat-stearin crystal interface. Striking confirmation was obtained for this theory by tests on the mobility of olive oil stearin suspended in triolein at 1·5° C.

Colour of Cooked Potatoes

The final contribution, "Method for the Determination of the Colour of Cooked Potatoes", from the laboratories of J. Lyons and Co., Ltd., was a joint paper by P. Bilham, Miss A. E. Maunsell, and Dr. L. H. Lampitt, read by Mr. Bilham.

The method of measuring the colour of cooked potatoes was devised to provide a grading system for potatoes showing a tendency to blacken on cooking. A panel of judges was provided with colour-cards to aid them in judging, and they were asked to give marks for freedom from greyness. They had no difficulty in matching the colour of a sample with one of a series of yellow cards, but their evidence showed that the yellow base colour of some potatoes tended to minimise the effect of any blackening. It was considered necessary, therefore, to have a test method having a physical basis for which a form of photometer was used, matching the colour of the potato with one of a series of standard yellow colour cards. The card matching the colour gave a record of the yellowness of the sample, and the reduction of the percentage of the light reflected from the card required to equalise the intensity of the light from the sample and card, a measure of the greyness. The accuracy was not high, but was sufficient for the purpose, and the use of the same colour standards by the panel of judges enabled a comparison of results to be obtained.

NEW FLAVOURING MATERIALS

Allyl Butyrate, shown by A. Boake, Roberts and Co., Ltd., at the recent British Industries Fair, is, we believe, an aromatic new to British commerce, which should prove of interest to manufacturers of flavouring essences for use by the confectionery trade. It has a very fruity, somewhat pear-like aroma, with a strong suggestion of butter, which should commend it as a constituent of toffee flavourings. The same firm have also recently undertaken the manufacture of ethyl methyl-phenyl-glycidate, commonly known as **"Strawberry Aldehyde",** owing to its marked strawberry-like aroma and well-known utility for use in strawberry flavourings. The very fine "Parex" grade of **Citral** and **Limes Oil Colonial** are definitely worthy of the attention of flavouring essence manufacturers.

Dutch manufacturers have also been responsible for the production recently of some interesting aromatics for use in the food industries. **Apricot E517** of the N.V. Chemische Fabriek "Naarden", of Naarden, Holland, may be new to many readers. It is of quite exceptional quality, and is understood to be chiefly obtained from dried Californian fruit by a new process, and to contain no added fruit-ethers.

Polak and Schwarz, Ltd., have just placed four new products of interest on the British market. These are **Cream Essence for Pudding,** an excellent product suitable for flavouring pudding and custard powders; **Frambol,** a concentrated raspberry flavour; **Fragol,** a concentrated strawberry flavour; and **Pear Essence "165".** The last is a pear essence of a highly aromatic character.

CONTROL and RESEARCH in FOOD MANUFACTURE

This picture was taken by the "Food Manufacture" representative in the refectory of the laboratories of J. Lyons and Co., Ltd., when members of the Institute of Chemistry paid a visit on March 3. On the left of the picture Miss A. E. Maunsell (in white coat) is talking to Dr. H. T. S. Sand, of the Sir John Cass Technical Institute.

Above: Microbiochemical laboratory, showing the new type of inoculation chambers and the type of shaking machine employed throughout the laboratory.

The picture on the right shows one of the rooms in the Milk Products Laboratory of J. Lyons and Co., Ltd., in which ice-cream mix is examined for fat, total solids and cane sugar or a control in its manufacture. The Majonnier Tester on the left is used for drying and the solvents used for separating the fats are contained in the apparatus mounted on the right of the Majonnier Tester.

The illustrations reproduced are by courtesy of J. Lyons and Co., Ltd.

A Visit to Lyons Laboratories.

BY COURTESY of J. Lyons and Co., Ltd., a party of members of the London Section of the Institute of Chemistry visited the company's laboratories at Hammersmith on Wednesday, March 3, and spent a very enjoyable afternoon, freely inspecting all the rooms and apparatus and tests in progress, with members of the staff.

The party assembled at 2.30 p.m. in the library, where Dr. E. B. Hughes, Assistant Chief Chemist, explained the arrangement of the laboratories and how they are responsible for control of work in the different factories and restaurants of the company. He then invited the visitors to make their own way about the building and to spend what time they desired in the various laboratories.

No more enjoyable way of visiting laboratories in which so much interesting and valuable work is being done could be imagined. A running buffet was provided in the refectory from 4 o'clock onwards, where visitors and staff mingled to discuss their various interests. There was an air of delightful informality which was appreciated by everyone, and many members of the party stayed until the laboratories were closed for the day.

As they are arranged at present the laboratories are equipped to carry out technical or small-scale experimental work, control and routine laboratory work, and research. The different sections are described under the following headings: Technical, Physico-chemical, Microbiochemical, General, Fruit Products, Bakery Products,

Milk Products, Oils and Fats, Cocoa and Chocolate, and Sugar Products.

Many pieces of apparatus attracted attention during the tour, and there was far more to talk about than could be crowded into one afternoon.

Physical Study on Difficult Problems

In the Physical Laboratory we were interested to hear about the application of X-ray crystallography to the study of problems not capable of solution by ordinary chemical or physical methods of examination.

A Spectograph is used in the same laboratory for the determination, by emission spectra, of traces of metals such as aluminium and zinc in foods, these metals being difficult to estimate in very small quantities by other analytical means. The rancidity of fats is also being closely studied by absorption spectrophotometry.

Potatoes and Fruit Juices

Some surprise was expressed at the attention being given to potatoes in the Fruit Products Laboratory, and it was interesting to find that work on potatoes was being done on behalf of the Potato Marketing Board upon the colour and quality of the potato when cooked. Some potatoes blackened on cooking and as a consequence mashed potato may become distinctly grey in appearance. On the other hand, a yellow colour may be developed in cooking. Very useful results have been obtained.

Bakery Experiments

A new Electric Oven for experimental baking in the Baking Section excited close attention. Quite apart from the electrical control of the temperature of the oven, the loaves are placed on a table in the oven which rotates slowly, thus ensuring that the loaves are subjected as nearly as possible to constant and equal conditions during the whole of the time of baking.

The Bakery Section is very well fitted for control and experimental work, and we were not surprised to find an apparatus for the estimation of the "compressibility" of cake sponge. For this purpose an apparatus for testing the strength of gelatine jellies has been adapted. In America the compressibility test has been used among other physical tests such as weight, volume and tensile strength to study the leavening property of eggs in sponge cakes (*Cereal Chemistry*, 1936, xiii, 6, 703).

Works Control

To illustrate how closely the control of works operations is maintained by the laboratory, visitors were able to see routine tests of ice-cream mix being carried out. The complete examination for fats, total solids and cane sugar is carried out in 25 to 45 minutes, and if the quantities are not found to be up to standard a standardising mixture is worked out for addition to the batch before it goes forward.

The many forms of control carried out by the laboratories take the chemist into every sphere, both in the works and in the restaurants, all complaints about food as served coming back to the laboratories for investigation. It is this fundamental principle of rigid control of works processes and of their ultimate presentation that yields a uniform and reliable product: and the function of the laboratories in maintaining quality by this means is of very great importance.

THE MILK in the COCONUT

WHAT is probably the most extensive investigation of the "milk" of coconuts has been reported by S. K. Ganguli in *Science and Culture* (India), vol. 2, No. 4, 1936, pp. 224-225, under the title "Chemical Examination of Water from *Cocos nucifera*". Three nuts were taken from each of sixteen trees growing at Baranagore, Bengal, and the samplings were made at four stages of ripeness of the nuts, varying from that of the green nut without any kernel to the brownish green nut with a hard kernel 10 to 12 mm. thick. Each of the forty-eight nuts was analysed separately at each harvest. The present communication gives only average values for volume of water, pH, percentages of reducing and non-reducing sugar, and of salt (mostly sodium chloride), and also mg. of ascorbic acid per ml.

Neither volume nor pH varied greatly, and the amount of non-reducing sugar was only about one-fifteenth that of the reducing sugar. It was found that as the nuts matured the percentage of sugar diminished considerably: in the least ripe the percentage of reducing sugar was 3·95, rising to 5·26 later, but falling to 2·24 in the ripest stage examined. An interesting feature was the discovery of a rough parallelism between sugar content and ascorbic acid content. The ascorbic acid content of coconut water has recently been investigated by other Indian workers. The water is supposed to be a useful medicament in urinary disorders.

FARMERS MUST ADVERTISE

FARMERS were advised to advertise more by Sir Herbert Morgan, speaking recently at Ipswich. He said that approximately £1,000,000 a day was spent on imported foodstuffs consumed in this country, and advertising could do much to persuade the public to eat more home-grown produce. The three great forces of mechanisation, standardisation and advertising had not been applied sufficiently to the British farming industry.

INDUSTRIAL NEWS

"Food Poisoning" Claim Fails

A claim for damages based on an allegation of food poisoning from mushrooms was dismissed in the King's Bench Division on February 26.

Mr. Sydney Harris, of Edgeworth Crescent, Hendon, alleged that the caterers at the Radio Exhibition, at Olympia, Messrs. J. Lyons and Co., Ltd., who supplied the mushrooms which he ate on August 29, were negligent and served mushrooms which were not fit for human consumption. As a result, he alleged, he suffered from food poisoning which made him seriously ill and which caused him loss of salary at £15 per week for several weeks, and other damage.

Messrs. Lyons contended that the mushrooms were perfectly good, and denied that they were in any way negligent. They also denied that Mr. Harris suffered from food poisoning.

Judgment was given for Messrs. Lyons with costs.

Synplas Gives American Moulding Exhibition

Synplas, Ltd., have collected over 300 American plastic mouldings in bakelite and synthetic resins from various sources in the U.S.A., and are holding an exhibition of them in Dorland House from April 12 to 17. The exhibition includes mouldings of interest to a large variety of trades, including wireless, electrical, jewellery, toy, cosmetic, and scale manufacturers. Admittance is by invitation card, which will be forwarded on application, the first two days being reserved for the Press, Advertising Agents, and Moulders.

Mr. G. N. Higgs, recently a director of Synplas, Ltd., collected these examples of American mouldings whilst visiting in the U.S.A. on behalf of his firm, and he will be present at the exhibition to give information regarding the moulding to all who are interested.

Advertising Canned Cornish Pilchards

Gilbert Kimpton and Co., Ltd., are to introduce canned Cornish pilchards shortly; the advertising for this new product is to be incorporated in the company's general advertising, handled by Griffiths and Millington.

With acknowledgments to "The Canner".

Mr. Ralph O. Dulany, the newly elected president of the National Canners' Association of U.S.A.

Bakers' and Confectioners' Exhibition

The forty-first Bakers' and Confectioners' Exhibition and Market is to be held this year from September 4 to 10, as usual at the Royal Agricultural Hall, London.

Members of the Baking Trade should make a note of this important week, and those firms who supply the Trade should, if they wish to be represented, make early application for particulars of spaces available.

Obituary Notice

We regret to announce the death on February 25 at Brighton of Mr. George Alfred Harvey, aged 84, the founder of the metal firm of G. A. Harvey and Co. (London), Ltd. From a modest beginning the firm has grown continuously until to-day the works cover 40 acres of ground and employ 2,000 hands.

The interest of Mr. Harvey in the welfare of his employees was shown by his inauguration of the Harvey Benevolent Fund with a gift of £15,000 and the foundation in 1935 of a Jubilee Trust Fund of £5,000 for necessitous cases in respect of junior workers. He also took a great personal interest in the development of a housing estate near the works for the benefit of his employees.

Queen Samples Canned Fruit

During one of her visits to the British Industries Fair at Olympia, H.M. the Queen stopped at the Scottish stand in the Empire section and sampled the canned fruit. When she was informed that the fruit had been grown near Glamis she expressed deep interest, and a selection has since been sent to her. The canned fruit was supplied by Lindsay and Lowe, Strathmore Fruit Co., Ltd., and Smedley and Co., Ltd.

Advertising Manager of Samuel Jones Resigns

Mr. Edward Beadle, who, for the last eight years, has been advertising manager of Samuel Jones and Co., Ltd., relinquished that position at the end of February in order to join R. Sculthorp and Co., Ltd., in an executive capacity.

Night Baking Enquiry

Sir John Simon (the Home Secretary) has decided to appoint a departmental committee to enquire into night baking. Lord Alness will be chairman.

The Government has been pressed by operatives to prohibit night baking, but master bakers are strongly opposed.

Metal Box Extensions

Additions are to be made to the Metal Box Company's can-making factory at Perry Wood, Worcester. They will include a new administrative and laboratory block and canteen. There will be a chemical laboratory, a bacteriological laboratory, and an experimental canning laboratory.

Box Makers' Rapid Extension

Hugh Stevenson and Sons, Ltd., 11, Southampton Row, London, W.C. 1, inform us that the extensions to their Leith factory have now been completed. The Birmingham works are moving into a factory which will be twice as large as the present premises. In Glasgow the company has sold its old premises and is moving into new ones. Further extensions are also being started at Manchester, and building will commence in connection with the London factory in two months' time. Over £25,000 will be expended on extensions during the course of the year.

Laporte's New Laboratories

On the occasion of a lunch in Luton, prior to the opening of Laporte's new laboratories at their Kingsway Works, Professor Donnan showed remarkable ability as an after-lunch speaker. He referred to his own experiences in designing and building laboratories, with varying success. He said that he had noticed with satisfaction that Laporte's new laboratories bore certain resemblances to his own at University College.

Mr. I. E. Weber, the Chief Chemist, thanked the Professor for his kind remarks. As an old pupil of Professor Donnan he was able to introduce some pleasant but obviously sincere compliments to his old master. Mr. Weber has seen 19 years' service with Laporte's and is now a director of the firm. He made a kindly reference to his chief assistant, Mr. Purdon.

References to the Technical Press, "pleasantly free of screaming headlines", were made by Sir Thomas Keens, a director of the firm. His reference to a "bonus issue" of shares is not, we think, to be taken as other than an after-lunch hope. His coupling of Dr. Herbert Levinstein's name with that of the toast of "The Guests" was made by warm references to Mr. Ivan Levinstein and his great efforts resulting in the passing of the Patent Acts, 1908.

After lunch, the whole party witnessed the official opening of the laboratories by Professor Donnan and made a tour of the premises.

New Factory for Valentine and Sons, Ltd.

A new factory is to be built by Valentine and Sons, Ltd., on ground behind the canning factory on Clepington Road, Dundee. The offices will front on Kingsway, and will consist of two storys. The factory lies behind, and is of one story. It will be 365 ft. long and 240 ft. wide, and will be built of brick.

New American Ice-Cream Carton

A new dull-finish ice-cream wax carton is gaining popularity in U.S.A. The method combines dry-waxing and tinting, and by its use packs for various kinds of ice-cream may be tinted and printed in comparatively small quantities, since preparation of specially printed card stock becomes unnecessary. The result is actually similar to that obtained by two-colour printing.

Although a greater quantity of paraffin wax is absorbed by the carton substance, evidence of waxing is difficult to detect. Surfaces are matt, non-greasy, therefore carton will take extra printing or rubber stamp devices without necessity of de-waxing. The aim has been to get away from the former high-gloss or hot-processing which, when stock is adequately impregnated, leaves cartons with a greasy appearance and a surface which refuses to take print. In the States, where this dry, smooth, dull-finish carton is approved by ice-cream traders, cartons can be supplied in tints formed from nine colours.

COMING EVENTS

April 8.—Institute of Chemistry—East Midland Section—at the St. James' Restaurant, Derby, 6.45 p.m. Annual General Meeting.

April 12-17.—"Synplas" Exhibition, Dorland House. (See particulars on p. 124.)

April 14.—British Association of Chemists, Liverpool Section. At the Exchange Hotel, 7.30 p.m. Annual Section Meeting.

Three new Sandwich Spreads—Cannabec Cocktail Cream Cheese, in Cocktail Glass; Cheddaspred; and "Redro" Fish Paste, which contains eight distinct kinds of sea-water fish.

The new ice-cream carton on which the evidence of waxing is difficult to detect.

International Sugar Conference

The Conference for the control of the production of and commerce in sugar is to open in London on April 5.

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Owing to the very considerable increase in the business of G. W. B. Electric Furnaces, Ltd., the registered offices of the company, including Sales Department, Drawing Office, and Accounts Department, have been moved to Belgrave House, Belgrave Street, W.C. 1 (Terminus 5191/2). The address of their associated company, Wild-Barfield Electric Furnaces, Ltd., will remain as hitherto.

Canned Human Blood

Canned human blood, preserved in refrigerators, has been sent to Spain for use in urgent blood transfusion cases.

Photo-Electric Colorimeter

A new model of the Bolton and Williams Colorimeter has recently been introduced for measuring the colour of any opaque plain surface, whether glossy or matt. This instrument may also be used with powders, pastes, or opaque liquids. It measures the percentage of various pure coloured lights reflected by the surface, the coloured lights chosen being spread through the spectrum. The results are independent of the idiosyncrasies of the human eye and are reproducible. The instrument is very sensitive, and will readily distinguish between colours so close in quality and hue as to be barely distinguishable by eye. The fading of colours through exposure may also be measured.

Canned Apple Juice

An entirely new non-alcoholic beverage in a can! Aplo and Grapo, Ltd., of London, are marketing an unfermented apple-juice drink—made in Switzerland—in a container after the "canned beer" style. The can has a special lining which retains the drink's fresh fruit flavour, and is of a handy size for carrying around. Made over here by the Metal Box Co., Ltd., cans for mineral waters should have a popular future.

Canning and Food Industries Club

The annual general meeting of the Canning and Food Industries Club was held following a dinner at Gatti's Restaurant on Monday, March 1. The following members were elected to the committee for the next twelve months:

R. Arnison (Short and Mason, Ltd.), M. W. Batchelor (Batchelor's Peas, Ltd.), J. A. Bowsher (Robert Ingham, Clark and Co.), Major R. J. O. Compston (L.C. Engineering Supplies, Ltd.), Gordon Fell-Clark (Robert Ingham, Clark and Co.), Dr. H. B. Cronshaw, Keith Fraser (FOOD MANUFACTURE), W. Leonard Hill (Leonard Hill Ltd.), J. W. Leno (L.C. Engineering Supplies, Ltd.), A. A. Maytham, S. W. Smedley (National Canning Co., Ltd.), Charles D. Snell ("Beth" Label and Wrapper Machines, Ltd.).

Mr. Snell was unanimously re-elected Hon. Secretary and Treasurer.

A New Dry Ice Chest

To a much larger extent than could ever have been expected has use of dry ice been adopted of late for refrigerating purposes, especially where clean and hygienic methods are vital factors, as well as a pleasing appearance of articles refrigerated. At forthcoming Leipzig Spring Fair a firm specialising in this branch is showing a new pattern dry ice chest which is chiefly for shops and contains, in addition to the refrigerating shelf, a number of porcelain ice boxes. Cooling is effected by a block of ice which is placed on a hook in the ice chest. With this new model the temperature can be regulated as desired. As the ice melts only very slowly the new ice chest is also highly economical and can be used to particular advantage where it is not possible or very difficult to use a motor or a refrigerating plant, for example, in marquees and organisations.

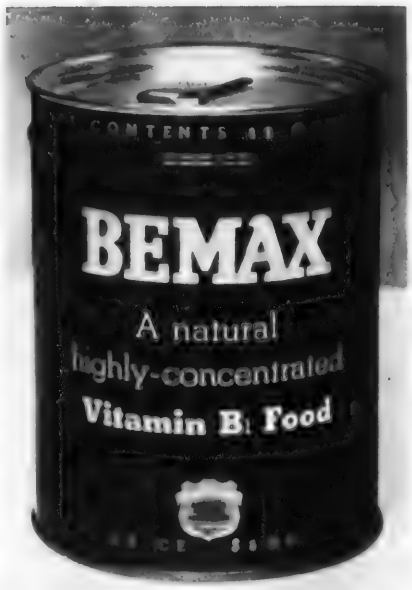
Ice in Crystal Form

By means of a machine designed in America ice is now being produced in the form of crystals, which can either be employed direct for the protection of perishable foodstuffs, or can be made into briquettes by a pressure of 2,500 lb. per square inch. These briquettes have a shape which allows free passage of air, and they give low temperatures more quickly than ice in any other form.

The machine used in the manufacture is made of aluminium, and consists of a double-walled cylinder with the space between the walls flooded with liquid ammonia, so causing the inner cylinder to become a direct expansion freezer, states the *Manchester Guardian Commercial*. A stream of water is passed through the inner cylinder, and as it comes into contact with the walls it is instantly frozen into a thin film of ice, which is removed by a series of revolving cutters. It is then carried, by the circulating stream of water, to a storage bin, where the crystals are deposited and drain.

Tinned Rabbits

Following an account of tinned rabbit prospects in a recent issue of our allied publication, *Food Industries Weekly*, a letter appeared in the *Daily Express* suggesting the same idea with the addition that work could be provided for the unemployed in the killing and canning of this growing pest.



New "Bemax" Pack

Vitamins, Ltd., manufacturers of Bemax, previously used ½-lb. and 1-lb. cutter lid airtight tins for their export market (excluding U.S.A.), but for Great Britain and America their product has been packed in a greaseproof bag inside a carton.

They have now adopted a 12-oz. vacinert pack for export to their American market. This is a gas charged collar-band tin, with key for opening spot-welded to the top. The inert gas used is a mixture of nitrogen and carbon dioxide. Elaborate lining precautions are taken: the inner bag is retained and the inside of the tin gold-lacquered; this method keeps the product in factory-fresh condition.

The container is manufactured by the Metal Box Co., Ltd., who have modernised the design; the characteristic lettering of the carton is retained, but the job is cleaned up by removing superfluous decoration. By reducing the colours to red, green, black, and white, they have produced a well-balanced package design.

Herring Levy Raised

From February 1 the levy of one penny in the £ collected by the Herring Industry Board under their powers was raised to twopence. This levy, which is collected by salesmen from buyers, is, with fees for licences, the sole source of income to the board apart from the Government grants which terminate in March, 1938.

An All-purpose Bakery Fat

A new bakery fat which marks a step forward in the production of ingredients for the bakery trade has just been placed on the market. Named "Covo", it is composed of vegetable oils, and made to the baker's own specification. It is double refined and solidified by a new process. By means of the latest type of equipment, chemical and physical operations are checked at every stage of manufacture, thereby eliminating the slightest trace of impurity, and giving a product of consistently high standard.

An official of the Covo Refining Co., Ltd., said in an interview that up to now bakery fats have been produced very largely to take the place of natural products, or to provide a cheaper substitute. "'Covo'", he continued, "combines the advantages of its predecessors, but at the same time possesses properties which must definitely lead to a new standard of cake production. It can be used with success in cakes, icings, bread, pastries, and fillings. In addition, its resistance to the stress of high temperatures makes it eminently suitable for all frying purposes.

"Contra-Cell" Heat Exchanger

The Contra-Cell heat exchanger is designed for processing milk to eliminate toxic bacteria and other organisms affecting the quality and safety of dairy products. The Contra-Cell heat exchanger provides a high velocity flow with low pressure, while the easy radius of the spiral path, relatively long channel and large surface contact area allow a rapid exchange of heat without turbulence to affect the cream-line qualities of the milk. The machine is made by G. Hopkins and Sons, Ltd., 40-52 Holloway Road, London, N. 7, as is also the "Contra-Cell" wort cooler designed for the cooling of beer and other liquids.

A Super Milk Bar

A super new "Black and White" milk bar has been opened in Coventry Street, London. It has 150 feet of counter space, three separate bars, and is fitted with the very latest glass-lined equipment. In one day it will be possible to serve 15,000 people, and, as Mr. Hugh D. McIntosh, one of the pioneers of milk bars in Britain, said to our representative, it seems to be the largest and best-equipped milk bar in the world.

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The new Pâté de Foie Can, now being introduced by Olida, will be illustrated next month.

TRADE LITERATURE RECEIVED

Monel Notes

Monel Notes—1 is the first part of a series of publications, issued by Henry Wiggin and Co., Ltd, on the properties and uses of Monel, with particular reference to the Power, Chemical, and Process Industries. The booklet contains many illustrations and the headings of the various sections are: A Modern Power Plant, Fasteners and Accessories, Gas-testing Bells, Whiter Clothes, Keep Up-to-Date, Piping Systems, Lorry Linings, and We Have Heard.

Duplex Mixing Machines

E. Hunt and Co., Ltd., Mellish Iron Works, Millwall, London, E. 14, have issued a catalogue for their Duplex mixing machines. An entirely new principle is embodied in this machine, and for equivalent mixes up to 50 per cent. of mixing time is said to be saved, while a standard product is obtained. The catalogue contains a number of illustrations of these machines.

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W. Edwards and Co., Allendale Works, Loughboro' Junct., London, S.E. 5, have repeated their low price offer of 1/50 h.p. motors and parts until available stocks are sold. The leaflet, which gives this information, describes the motor as fitted up as a stirrer and emulsifier, with prices of all the component parts.

▼ ▼ ▼

F. Winkworth and Co., Ltd., London Road, Staines, have sent us a copy of their stock list of machinery. Types of machinery are shown under a number of headings, including crushing and grinding mills, mixers, pans, rubber plant, vacuum drying and cooking plant, etc.

▼ ▼ ▼

Kirby's (Engineers), Ltd., Walsall, have published a large number of leaflets describing their machines for use in the production of cardboard containers, cartons, etc. Machines such as cutting, creasing, and embossing platens, rotary shear cutting machines, vertical bending machines, slotting machines, folding box machines, cutting and scoring machines, corner staying and ending-on machines, topping machines, and glueing machines are included in the wide range available.

Corrosion-Resisting Plant

John Thompson (Dudley), Ltd., have issued a booklet dealing with their corrosion-resisting plant. An introduction gives a brief account of the history of the firm and the foundation of the "John Thompson Group", and the main body of the booklet describes and illustrates corrosion-resisting plant, some of which is of particular interest to the manufacturer of foodstuffs.

Fabrication of Stainless Steel

The United Steel Companies, Ltd., have sent us a copy of this publication, which is a reprint of a lecture given by Mr. F. D. Gordon to the Works Management Association, Yorkshire Branch, Leeds. The booklet contains numerous illustrations, and the information contained in it will prove genuinely useful to all those who have to deal with the fabrication of stainless steel.

Lighting Units

Crompton Lighting Units is the title of the latest catalogue issued by Crompton Parkinson, Ltd., Bush House, London, W.C. 2. It is of the loose-leaf type with a strong cover so that additional pamphlets issued by the company can be inserted. The booklet gives particulars of the Crompton lighting units, information as to the correct usage of artificial lighting, and introduces the Crompton lighting service.

Power Factor Correction

A new booklet issued by Dubilier Condenser Co. (1925), Ltd., Victoria Road, North Acton, London, W. 3, refers to power factor correction by means of electrical condensers. The booklet comprises a useful treatment of this subject from the economic, technical, and commercial angles. The company will be pleased to send a copy to any reader who writes mentioning FOOD MANUFACTURE.

Trailers

The latest catalogue of R. A. Dyson and Co., Ltd., 76-80, Grafton Street, Liverpool 8, demonstrates the range and variety of the trailers built by them. The catalogue is profusely illustrated with trailers of all kinds, including many types used in the food industry. Copies will be supplied by the company to any reader of FOOD MANUFACTURE who is interested.

BOOK REVIEWS

"Food Manufacture's" Encyclopaedia

If you are a miller, a baker, a confectioner in flour or in sugar, a jam maker, a canner, a meat product manufacturer, or a dairyman; if you are concerned in the wrapping and packing of food products of any description for home or overseas consumption, or in the storing and preservation of food by refrigeration or any other means; indeed, if you are in any way engaged in the food industry, you are certain to find useful information in *Food Industries Manual*, the 1937 edition of which has just been issued by the publishers of *Food Manufacture* and *Food Industries Weekly*. This is the seventh annual edition, and is rightly described on the spine of the cover as an encyclopædia of food manufacture.

According to the preface, the authors responsible for compiling the different sections have again checked existing information, and from the text it is evident that a considerable amount of new information and data have been included. The Canning Section, for example, has been quite extensively revised. Under new headings reference is made to Clinching Machines, Closing Temperatures for Cans, Fruit Salads, Headspace, Meat Canning, the Canning of Potatoes and Turnips, Pressures in Cans—all items of essential interest to the canner. This section also contains a large number of illustrations of the latest type of canning equipment.

Invert sugar and its use in confectionery and manufacture is now dealt with at length in the Sugar Confectionery Section. In the same section Milk Chocolate receives special attention instead of a mere reference, and information about Marzipan Substitutes and White Chocolate is included.

The Packing Section has also undergone considerable change with the introduction of recent information. Under the heading "Metal Closures" all the latest caps and seals are described. Reference is made under "Colour in Packaging" to the recent work on coloured transparent materials for wrapping foods affected by light, such as butter and other fat-containing substances. An "old gold" film has been found most practical. Another helpful feature of the Packaging Section is the fact that information about Fibreboard Containers has now been collected together under one main heading. Filling, Weighing, and Sealing Machines are also dealt with together.

The Food Storage and Refrigeration Section is brought up to date with essential information and data concerning the Gas Storage of Fruit. Much more information is given about Insulation, the different forms such as cork, hairfelt, glass wool, etc., being described under separate headings. Reference to Vacuum Refrigeration is now included.

The Bibliography of Technical Books which follows the editorial section has also been recomposed. By comparison with previous editions many more books have been included.

So much for the technical information and data. It is too much to expect a work of this nature to be reconstructed in every essential each year. But the amount of new and revised data in this edition is really remarkable.

None the less interesting and useful is the Advertisement Section, containing as it does information and illustrations about practically everything, from materials to plant, used by the food manufacturer. A classified index of manufacturers and suppliers is provided to facilitate reference to advertisements concerning particular materials.

The manual is bound in a stout linen cloth cover with embossed gold lettering, and has indented thumb tabs for ready reference to the main sections. There are 130 pages of advertisements and index matter, 225 pages of technical information and data, and 80 pages of bibliography, making a total of 435 pages for the modest sum of 10s.

C. G. R.

Food Industries Manual. Leonard Hill Limited. Pp. 435, quarto. 10s.

Agricultural Analysis

The Association of Official Agricultural Chemists of America in September, 1920, did a great service to agricultural, cereal, and other chemists by the publication of the official and tentative methods of analysis approved by the Association. It is extremely important when dealing with such vague and ill-defined substances as cereals that there should be some standard methods of analysis which make possible the obtaining of comparable results in different laboratories in different countries. The publication in 1920 of the first edition of this work marked the beginning of standardisation in a previously very vague field of analytical chemistry. Good though this first edition was, the sponsors were not content to rest on their laurels, and they planned to publish a revision every five years, and, in accordance with plan, the fourth edition has duly appeared.

Like any work of this sort, each edition is bigger than its predecessor. The second edition, with which the reviewer was most familiar, contained 535 pages of very meaty matter. The fourth edition runs to 710 pages. It must not be thought that this edition differs from the earlier ones merely in point of size. As well as the additional methods which appear there are to be found a number of revised methods. One case of special interest to the reviewer is that for the determination of fluorine in baking powders. He remembers the many efforts he made to obtain consistent results with the method given on page 312 of the second edition, and, after fitting up the very complicated apparatus pictured on page 313 and taking endless precautions, after much pain and tribulation gave it up as a bad job! In the fourth edition this method has been omitted and is not replaced by any other, for the simple reason that no satisfactory method has yet been evolved.

There is a tentative method suggested for the determination of fluorides in insecticides (p. 46), but the reviewer has not yet applied it to baking powders or acid calcium phosphate. Two chapters of the third edition—*i.e.*, Fibers and Paper and Paper Materials—have been deleted because, at the present time, the work on these materials is not considered to be of sufficient importance to warrant co-operative referee work, and also because such methods are being studied elsewhere. On the other hand, chapter xvii of the third edition, on methods for beers, wines, and distilled liquors, has been made the basis for three chapters in the fourth edition, entitled respectively: Malt Beverages, Sirups and Extracts, and Brewing Materials; Wines, and Distilled Liquors.

Some of the additions are worthy of mention. There has been a lot of work done recently on the rôle of selenium in plant metabolism, and the method for the determination of selenium in the chapter on Soils is valuable. In the chapter on Insecticides and Fungicides a method is given for the determination of the phenol coefficient of disinfectants. This is of value to official analysts, as, unfortunately, this unsatisfactory method of evaluation of disinfectants is the only one recognised officially. In the chapter on Grain and Stock Feeds an assay by preventive biological test is given of vitamin D.

It is obviously impossible in a review of this kind to enter into complete details. There may still be many methods in the compilation that are not entirely satisfactory, but there are an enormous number that are satisfactory. One is sorry that the method for the determination of lead in baking powders has been deleted and not replaced except by the elaborate method occupying several pages in the chapter on metals in food, but the chemist who is not yet satisfied with his own method for determining lead in, say, acid calcium phosphate cannot fail to evolve one from the mass of information given in this section.

It is a monumental work, and adverse criticism would be deplorable, and in reference books of this type one can only thank the compilers for their efforts. The reviewer has derived great benefit from the previous editions of this work,

and many of the daily routine tests now a commonplace in his laboratories have either been derived from, or augmented by, the methods and suggestions in it. This fourth edition can take a proud place in the reference book shelves of any laboratory—not necessarily those dealing with agricultural and cereal problems.

T. H. F.

Official and Tentative Methods of Analysis of the American Association of Official Agricultural Chemists. Fourth Edition. $5.50.

Author and Business Man

Mr. A. Ll. Matthison is well known to our readers as a past president of the Food Canning Council, of the Paint Federation, and as managing director of the old-established paint and varnish firm Arthur Holden and Sons, Ltd. All these facts point to business success, and one is rather apt to think that in the case of a successful business man the interest ends there, but there are refreshing exceptions, and Mr. A. Ll. Matthison has already shown in his *Art, Paint, and Vanity* that he is an officer in the small regiment of exceptions, and that fact is confirmed in his latest book, *Less Paint, More Vanity*.

Not only does his interest in good literature and music permeate the whole book, but also his profoundly unselfish interest in his fellow-men. To quote from the last pages of *Less Paint, More Vanity* with reference to his own firm:

"The ideals of humane treatment, high wages, good conditions formed in my Socialist days were shared by my co-directors, and their cordial co-operation in establishing them in our business has always been a pleasant feature of our long association. We are a happy band of contented workers, bound together by ties of consideration for each other, and of mutual help."

But the book is really a vertical section of an interesting life crowded with events of reading value to us all. To quote a few: Intimate glimpses of actors and musicians in the early days at Birmingham; the sanitary "pan" system in operation in 1874; the first talking machine; dances in the eighties; theatre-going in London in 1885; petty tyranny in the early days of the Post Office; sidelights on national census taking; Ellen Terry and Edith Wynne Matthison; flirting in Morse at H.M. Telegraph Office; Birmingham Labour Church; Robert Blatchford; bribery in the trade thirty years ago when most works managers had to be bought; American methods of hospitality; the freedom of Scandinavia; South Africa; and so on through all his life from his start as a boy sorter in the Post Office to warehouse clerk, and finally managing director of Arthur Holden and Sons, Ltd. Drama, music, politics, and work—Life.

Mr. Matthison believes that very often the personally technical help of the small man is considerably greater and more valuable to his clients than that of a large concern, but he advises the small man to give support to his trade association—to have, in fact, a wide outlook.

The last four chapters might very well be printed separately under the heading "How to have a Successful Business and keep a Humanitarian Outlook". A versatile book. Something of interest for all—and food for thought.

M. E. N.

Less Paint, More Vanity. By A. Ll. Matthison. 1937. *Pp.* 219. *Price* 7*s.* 6*d.*

Practical Dietetics

At the present time, when the literary field of dietetics is so widespread, a volume which contains as much condensed information as *Applied Dietetics* should be welcomed by any worker in this branch of science.

A large proportion of the book is given to tables, which are clear and concise; it should therefore prove a valuable source of reference for the dietitian, and also be useful to anyone with a physiological or chemical training. Merely by turning to the necessary table one can find what foods are available as a source of iron or calcium, information on protein equivalents, the energy requirements of children and adults, and, in fact, any data needed for the basis of arranging a specific diet.

On the whole there is an atmosphere of common sense, a most welcome aspect at a time when so many "cranky" diets are advocated. For instance, the author points out that the figures given are only *average* and not absolute, and that variation must be taken into account. The book is well planned and arranged in such a way that it can quickly and easily be used for reference. The detailed chapter headings at the beginning are a great advantage, and the list of abbreviations on page 109 are a convenience in that one approaches the tables knowing what is meant by s., sc., L., etc., instead of having to assume or guess a meaning. The conversion of scientific weights and measures to the more familiar household terms of spoonfuls and cupfuls makes the book of equal use to the non-scientist. Information on average, too, is especially useful for those who have no access to balances. The method of working out the food value of any diet is carefully explained, as also is the planning of any definite diet containing specified amounts of fat, protein, etc.

The dietary outlines for various diseases provide interesting reading as well as useful information. In many instances alternative menus are offered, one for moderate cost and one for liberal cost—very necessary information for anyone dealing with patients possessing only limited means. One might, perhaps, wish the author had included one more table giving an alphabetical list of the most commonly used foods with their percentage compositions.

There appear to be very few misprints or inaccuracies, but on page 5 the requirement of phosphorus should be 1·32, not 0·32, and in the weight-height-age tables it would have been better to state that the figures given are pounds.

In addition to the tables, the author deals briefly with the scientific principles underlying nutrition, the subject matter being treated in a simple yet interesting and logical manner. For further detailed information the reader is wisely referred to more advanced and specialised literature. Throughout there is a keynote of common sense and reason, and, although writing primarily on diets and their constitution, the author fully realises that in general welfare there are other factors to be considered, such as shelter, clothing, and savings. She refers to occupation, general habits, recreation, etc., as subjects which are themselves of importance and need to be considered in relation to diet.

Miss Stein justifies the title of *Applied Dietetics* by including not only a scientific explanation of such things as caloric values of food factors, but also menus and suggestions for ways of using different foods.

G. A. H.

Applied Dietetics. Frances Stein. 1936. *Pp.* 263.

Bell's Sale of Food and Drugs

(*Continued from page* 133.)

or beer, will give a useful lead where there is any doubt as to the wording of labels or advertisements. Apart from these additions, which necessitate another twenty-two pages, the volume is practically the same as the last edition, though the author has taken the opportunity to correct several minor errors, and we are no longer told that the analyst (meaning the public analyst) need not make the analysis personally, but may do so through his assistants, but are informed that he must carry out the analysis personally or supervise the work.

The volume is well indexed, and Mr. Robinson is to be congratulated on keeping the matter within reasonable limits, whilst at the same time including all essential matter. The publishers are to be congratulated also on the printing and binding.

T. McL.

Bell's Sale of Food and Drugs. By R. A. Robinson. Ninth edition. Pp. xxviii, 321, and (Index) 37. 1936. *Price* 15*s. net.*

BLAMING CANNED FOODS AGAIN

As reports of cases of food poisoning appearing in medical journals may possibly give rise to statements in the daily press liable to damage the reputation of canned foods, we have asked Mr. T. Macara, F.I.C., Director of the British Food Manufacturers' Research Association, to examine a recent case of food poisoning in an institution in which the infection was attributed to canned mutton. Mr. Macara considers the conclusion reached in this case to have been illogical.

THE *British Medical Journal* for February 13 contains an article written by Dr. A. R. Culley, Medical Officer of Health for the County Borough of Carmarthen, dealing with an outbreak of food poisoning which occurred in a mental hospital.

Fifteen of the 763 inmates are stated to have suffered from vomiting or diarrhœa or both on September 22 last, and two of them died. As food poisoning was at once suspected, the medical authorities immediately investigated the cause of the outbreak. Attention was naturally directed to the types of food consumed during the previous 48 hours and the distribution of these among the patients. It is to be noted that in this report only three types of foodstuff are referred to—viz., milk, breakfast sausage and canned mutton. The breakfast sausage was supplied for breakfast on the 20th and the canned mutton for dinner on the 21st. No mention is made of what foodstuffs were supplied for other meals which presumably these patients had consumed between breakfast on the 20th and the time of their illness on the 23rd. It is stated, however, that every other article in the dietary was used in the hospital block and no cases occurred there.

Cause of the Deaths

By a process of elimination it was found, according to the doctors, that only those inmates or employees who had consumed mutton were ill or gave signs of infection when an agglutination test was tried. It was, however, definitely proved that the two who died had been infected with *B. enteritidis*, and this organism was found in the stools of six of the others who recovered. It is quite certain, therefore, that this organism was the cause of the outbreak.

One unopened tin of mutton, examined bacteriologically for *B. enteritidis*, gave negative results, as did also two tins which had contained some of the mutton consumed. It should be noted that in this instance there is no doubt that the illness was actually due to infection with the living bacillus, consequently the presence or absence of its toxin is of no interest in tracing the source of the illness.

The conclusion arrived at was that the infection was undoubtedly conveyed by the canned mutton. In confirmation of this, emphasis is laid on the fact that all the kitchen maids except one gave a positive agglutination reaction to *B. enteritidis*. The one who failed to show this reaction had been absent on the day the mutton was in the kitchen.

Dr. Culley then proceeds to discuss possible animal sources of infection, including human carriers in the institution, and concludes that none of these could be the source. He suggests that the organism must have been in one tin only of the canned mutton. Although he admits that it could scarcely survive the "cooking process", he yet goes on to suggest that the mutton in this particular tin must have been infected prior to the sealing of the can. He is led to this conclusion because of the differences of the intensity of the illnesses of different patients in the separate wards, those in one ward apparently receiving more heavily infected portions than those in the other wards. He appears to visualise the infection as having started from one piece of meat in the can and from there spreading to pieces more remote.

An Illogical Conclusion

To anyone familiar with the process of canning this conclusion will not only seem illogical but actually nonsensical. This bacillus is readily killed at temperatures well below the boiling point of water. Had the contents of the can not reached this temperature or, in fact, a much higher one—*i.e.*, after sealing—it is certain that the can would have become blown, as other bacteria of a putrefactive type were almost certainly present on the mutton at the time it was put into the can.

The fact that the meat was unevenly infected and confined to a relatively small number of portions of mutton would seem to point to the product having been contaminated by a carrier—*i.e.*, on the assumption that the meat was the vehicle in this instance. The doctor's only reason for assuming there were no carriers of this organism in the kitchen was that none of the persons working there had shown any signs of illness.

This does not seem to be sufficient evidence to prove that none were carriers, as 8 persons, who were in the kitchen, afterwards reacted to the agglutination test. Did all of these eat mutton from the same can? If they did it seems strange when 26 other cans were opened at the same time. Because no one admitted having been ill, can it be assumed that none were carriers?

It is admitted that there was a water-closet in a room opening directly off the kitchen; in fact, the very condi-

tions which would permit a carrier to convey the infection. The very irregularity of the infection on the meat as deduced from the severity of the illnesses is much more easily explained by this theory than any other.

In the summary to his paper the doctor states:

"(2) It is suggested that canned mutton was the food involved."

"(3) By probability only, and by no scientific proof, it is suggested that the mutton was infected in some manner and was not taken from an infected animal."

It will readily be admitted that there is obviously some justification for the statement No. 2 above. If his final conclusions had been merely that expressed as in No. 3, one could only have complained of its vagueness as regards the original source of infection, but the last paragraph of the report leaves no doubt in the mind of the reader that he actually believes the infection took place in the canning factory and that therefore the packers are to blame.

In view of the fact that "scientific proof" was lacking, one might have expected a man of Dr. Culley's eminence to express his conclusions as regards the original source of infection with much greater caution.

Bacteriologists familiar with canning problems will agree that such evidence as there is rather indicates the original source of infection as having been in the institution, probably a human carrier, than in the packing factory.

It almost appears as if Dr. Culley allowed himself to be swayed by that latent prejudice against canned products that still persists in many people, otherwise, on the basis of his evidence, he should have merely stated that the original source of infection had not been discovered.

THE ODOUR of GRAIN

THIS question is discussed by Dr. Hugo Kühl in a short review in *Die landwirtschaftlichen Versuchs-Stationen* (vol. 127, 1936, Heft 3 and 4, p. 149). The author adds seven references to scientific investigations bearing on the general question of the odour of breadstuffs, but says that he knows of no experimental investigation of the odour of raw grain. As his references are exclusively German, it can perhaps be suggested that work on the subject may have been done outside Germany.

Kühl affirms that all grain has a specific odour due to the species. The odour of fresh wheat or rye grain can, however, be influenced by a number of external factors, such as contact with soil, degree of moisture at harvest, time and humidity of storage, and the activities of superficial micro-organisms as well as those that may be borne by diseased grain. Another very important factor is the presence of weed seeds: the seeds of at least one type of weed common in Germany are capable of imparting a garlic odour to the flour and to cause much trouble in cleaning of rolls.

Although no work appears to have been done on the cause of the characteristic odours of grain, it has been noted that these odours are more pronounced after milling than when the grain is whole: this is presumably due to the freer evolution of the odorous substances from the increased surface. Kühl accepts the view of Masling that acetylmethylcarbinol, a normal constituent of the odorous complex of bread—at least on the Continent—is a by-product of the alcoholic fermentation of sugar. According to Kühl, Beccard was the first to show that acetic acid is present in small amounts in bread crust. Neither acetic acid nor the carbinol can, however, be supposed to exist in the raw grain.

Although quite marked odours of cinnamon, musk and even coumarin are claimed to have been noted in bread grain, Kühl rejects the idea of Deutsch-Renner that these odours were due to the presence of essential oils. Kühl thinks that such aromatic odours are rather to be ascribed to the decomposition of amino-compounds; thus, tyrosin and phenylalanine are capable of yielding cinnamic aldehyde. The activity of bacteria may lie at the root of such breakdown. Essential oils are nevertheless recoverable from grain if the grain contains a proportion of weed seeds bearing volatile oils.

Secondary Odours

Other odours of grain are those that may be called secondary, and are due to absorption by the grain of odours from the atmosphere. Damp grain also provides a suitable home for numerous micro-organisms. Disease organisms present in the grain will extend their activities during storage if the grain is damp. Poor storage conditions also favour the development of numerous bacteria and fungi, initially on the surface, but later penetrating into the food reserves of the grain, which are decomposed with the production of various odours. Secondary odours may be contracted during transport; thus, if the grain is carried in a waggon that has been disinfected with carbolic acid there is a likelihood of the grain emerging with a phenolic odour.

Of special interest is the question of the odours in grain due to rancidity of the germ oil. These odours appear to be aldehydic, and thus have a similar origin to the rancid odours of fats and oils in bulk. Kühl refers to his own work on the detection of rancidity in flour by an application of the well-known aldehyde test (fuchsin in sulphurous acid solution) and claims that this test is much more sensitive than a subjective test by smell.

THE NEW FRENCH CANNING SCHOOL

Described by our Paris Correspondent

THE RECENTLY inaugurated canning school of the French Federation of Canners' Syndicates is the result of a long-standing project which has only recently been fully realised with the completion of an installation in which both practical and theoretical courses can be given and in which experimental work can be carried out.

The school is housed in two buildings connected by a covered passageway, the front building being used for the theoretical studies and the rear one for the experimental work and practical studies. There is a director's office, a main classroom, and a library where books on canning questions as well as journals dealing with food questions are at the disposal of the pupils. There is also a small canning museum and a stock-room.

Theoretical and Practical Training

The school is able to accommodate twenty-five pupils. These are to be specially selected workmen and foremen who will follow a course of twelve lectures, accompanied by demonstrations. The purpose of this course is to give the workers in canning plants a chance to see a theoretical basis to the practical knowledge that they have gained in their work.

The practical work is arranged for engineers, chemists and plant managers, and is intended to give men who already have a general practical and theoretical education a chance to perfect the application of their knowledge to canning problems. This section is formed mainly of a laboratory installed in a long hall running the full length of the building, which can be seen in one of the accompanying illustrations. The apparatus comprises microscopes, test tubes, reagents, etc., for each pupil, and two ovens for the heating of specimens, as well as a small autoclave. In this room the pupils are taught how to determine the various types of spoilage and their causes, work which is completed by a theoretical and practical course on how to avoid them. Bacteriological work, food chemistry and food testing are also taught here.

Model Canning Plant

Beside this laboratory, and separated from it by a glass partition, is a small model canning plant. This has only been partly installed up to the present. Further equipment is to be added as soon as the necessary funds have been obtained. The present plant consists of a boiler providing the steam necessary for the installation,

This photograph shows the model canning plant at the school, used by the students for practical work. This plant is to be extended as soon as possible.

a copper cooking pan, an aluminium cooking pan, a cooling pan, and a retort. In the centre of the room space is provided for a pea huller, a pea sorter, a crusher and a strainer, as well as a can-sealing machine shortly to be erected. This plant is to be used for pupils to make practical tests on actual installations and for experimental work to be carried out on a semi-industrial scale.

The laboratory side of the experimental work is to be done in a fully equipped laboratory adjoining the canning plant, part of which can be seen in the accompanying illustrations. There is also a hot room, divided into an outer section heated to 98° F. and an inner chamber heated to 131° F., for use in bacteriological tests. These have space for about 700 cans. Finally, there is a photographic dark room and an outdoor laboratory installation placed under a glass hood. The latter is arranged for experiments which must necessarily be done in the open air.

A view of the experimental laboratory where the chemistry of canning is taught.

BELL'S SALE of FOOD and DRUGS

IT IS a commonplace that ignorance of the law is no excuse, and yet it is surprising how frequently manufacturers plead ignorance of the law when they receive complaints about their preparations from public health authorities. It is regarded as essential that it should be the duty of someone on the staff to know all that is to be known about alcohol rebate, postal regulations, foreign Customs requirements, etc.; yet for some reason it is never considered necessary that the laws controlling the sale of food and drugs should be known. Whenever a case is heard in court the legal representatives of both sides produce a copy of *Bell*, one of which is usually handed to the learned magistrate.

In other words, *Bell's Sale of Food and Drugs* is regarded as a standard legal textbook which, contrary to expectations, is written in simple English and is published at a moderate price. There is therefore no excuse why it should not be on the library shelves of every firm connected with the manufacture or sale of food or drugs, and if only manufacturers would make themselves better acquainted with its contents it is certain that many of the trivial complaints regarding the composition of foods would disappear.

At the same time it must not be considered that the British law is entirely straightforward, because we learn, on page 314, that, as the result of a considered judgment, it was held that " So long as the nature, substance, and quality are not affected, there is no law against the miller bleaching. The colour of flours from various wheats varies, and therefore bleaching is resorted to to preserve uniformity ". Later, on page 318, the author adopts the recognised ruling that mustard containing starch or turmeric is adulterated; one might have argued in ignorance that starch and turmeric were merely added to improve the flow and colour of the mustard. It is the recognised custom in the trade to colour pepper, but one wonders whether this is not really a form of adulteration if the addition of turmeric to mustard is adulteration.

From the manufacturers' point of view appendix ii is undoubtedly the most interesting, as this deals with chemical notes on some of the commoner forms of adulteration, and these might be extended with advantage. At the same time it would be useful if the author were to obtain advice from chemists or members of the trade on some of the points he raises in this appendix. He tells us that convictions have taken place in respect of the sale of ground almonds containing ground peach kernels, a statement which one often hears, but which appears to be incorrect at the present time. It is almost a matter of impossibility to obtain peach kernels in this country, but there is a good supply of apricot kernels and arachis nuts available, and these are regularly employed.

Whilst arsenic found its way into beer as the result of the use of sulphuric acid in the converter some years ago, it cannot be said that it ever originates in this manner nowadays.

The statement that " Considered magisterial decisions have been given to the effect that no offence is committed when buns, sandwiches, and other articles of ' cream confectionery ' containing either artificial cream or a cream substitute are sold under such descriptions as ' cream buns ',' " cannot be allowed to pass without a challenge. One such decision has certainly been given, but the majority of decisions by benches of magistrates are still to the effect that it is an offence. The trouble at the moment is that no local authority wishes to be saddled single-handed with the cost of High Court proceedings to settle the point. It will come as a shock to most people to learn that " the addition of harmless colouring matter to jam is usually considered to be quite legitimate ". It seems to have been taken for granted for some years now that the Preservatives Regulations permit the addition of colouring matters to almost any food other than milk or cream.

The present edition includes matter necessitated by the Milk Act, 1934, and the promulgation of the Milk (Special Designations) Order, 1936, but unfortunately does not deal with the revised Memorandum 139. A whole chapter is now devoted to the Merchandise Marks Act, which should prove of use to manufacturers and wholesalers, and the reprinting of Notice (No. 222 A) by the Commissioners of Customs and Excise, dealing with the misdescription of articles as spirits

(*Continued on page* 129.)

The Antirachitic Value of Canned Salmon

By Basil E. Bailey

Pacific Fisheries Experimental Station, Biological Board of Canada
Prince Rupert, B.C.

DURING THE last quarter of a century advances in knowledge of the science of nutrition have shown that a number of diseases are due to dietary deficiencies of specific factors, and that they may thus be controlled by dietary means. Rickets is one such disease. Long recognised as a definite disorder, it is now known to be due to the combined effect of a deficiency of vitamin D and phosphorus in the diet. It is essentially a disease of childhood, an upset of the calcium and phosphorus metabolism, and is intensified rather than relieved by excess calcium in the diet if unbalanced by the necessary complement of phosphorus. A diet high in phosphorus and low in calcium, on the other hand, causes osteoporosis, a condition as serious as rickets. Vitamin D serves to regulate the assimilation by the body of these two bone-forming materials, but its effectiveness is greatly increased when the minerals also are supplied in adequate amounts and in satisfactory proportions to one another. Although rickets can usually be cured, in advanced cases permanently deformed bones and poor dental development remain.

While the disorder can be prevented by an adequate diet, the accomplishment of this is in many cases a social problem which may be due to ignorance or financial inability to include suitable foods in the diet. Natural vitamin D is not of very common occurrence. Although the inclusion of various irradiated foods in the diet, or bodily exposure to ultra-violet light have an action similar to natural dietary antirachitics, there is considerable evidence pointing to the greater efficacy of the natural vitamin.

Numerous studies of vitamin D, calcium and phosphorus contents of various foods have been reported in the scientific literature. Wide variations in respect to these dietary factors have been observed among different foods. Some are entirely devoid of vitamin D, others contain appreciable amounts, and, while the bone-forming minerals are more widely distributed than vitamin D in foods, their amounts also vary considerably, both in individual quantity and relationship to each other. It has been found that canned salmon is one of the most potent natural antirachitic foods. Other substances—for example, cod liver oil—contain more vitamin D, but they should be regarded as medicinal sources of the vitamin, and are unnecessary if adequate amounts of antirachitic substances are included in the regular dietary.

Vitamin D Potency

The vitamin D potency of the canned product from two species of British Columbia salmon has been reported from these laboratories by Bailey.[1] The average vitamin D contents of sockeye ("red") and pink salmon were found to be respectively 880 and 1,700 international units per pound of canned fish. Subsequent determinations have shown the approximate average vitamin D contents of canned spring ("red"), coho ("red" or "medium red"), and chum salmon, taken in British Columbia waters, to be 1,700, 1,100, and 900 international units per pound respectively.

Eggs are usually regarded as one of the most potent natural vitamin D-containing foods. From the data of Branion, Drake and Tisdall[2] and Sherman[3] it is calculated that fresh eggs contain on the average 186 international units (68·8 Steenbock units)* of vitamin D per pound on the basis of the whole eggs as purchased, or 208 international units (77·0 Steenbock units)* per pound of edible material. Liver has also been reported to contain appreciable quantities of vitamin D. Like fish and eggs, it is a practically complete protein food, supplying almost all of the essential amino acids for adequate nutrition, so that a comparison of the three as antirachitics can be made on a comparable basis, since all are composed chiefly of the same foodstuff. Devaney and Munsell[5] tested samples of beef and hog liver which were found to contain from 180 to 225 international units of vitamin D per pound. They also investigated calves' liver, which proved to contain very little of the vitamin, a fact which is confirmed by the work of Coward and Morgan.[6]

Therefore, of all these foods mentioned, salmon canned from any one of the above five species is by far the most potent source of vitamin D. Moreover, its activity in the prevention of rickets is increased by virtue of its high content of calcium and phosphorus, since, when canned, the bones of fish are converted into an edible form which greatly increases the amount of edible mineral in the can. The percentages of calcium and phosphorus in canned salmon, eggs, and liver are given in the accompanying table compiled from the data of Carter,[7] Riddell,[8, 9] Sherman,[3] and Bauer and Aub.[10]

Food.	*Calcium. Per Cent.*	*Phosphorus. Per Cent.*	*Reference.*
Canned salmon:			
Sockeye ("red") ..	0·24	0·30	(7 and 9)
Coho ("red", "medium red", or "blueback")	0·28	0·30	(8 and 9)
Pink	0·19	0·26	(7 and 9)
Eggs:			
As purchased	0·06	0·14	(3)
Edible portion only ..	0·07	0·15	(3)
Liver	0·006	0·275	(10)

From the table it can be seen that canned salmon, which, as already pointed out, is an unusually rich food source of the antirachitic vitamin D, also contains relatively large amounts of the two minerals whose utilisation by the body is controlled by that vitamin. In addition to containing amounts of calcium and phosphorus higher than the average for antirachitic foods, the quantities of these two minerals are in closer balance in canned salmon than in any of the other foods discussed.

(*For References, see page* 139.)

* Official U.S.P. conversion factor 2·7 used for calculating international from Steenbock units. Steenbock (4) has since revised this factor to 3·3.

COSTING in the FOOD INDUSTRY

The Basis of a Practical Accounting System

By S. Howard Withey, F.C.I.

ALTHOUGH MODERN processes of preparing, blending, drying, and powdering are very numerous and varied, and food manufacturing and packing operations are far from being uniform in character, it is possible to outline a general plan of costing and internal check that can be set up and modified to meet the particular requirements of any food producer or packer, whether carrying on business on his own account or as a partner of a firm, or a director of a limited liability company. It is true that in the case of the small food manufacturing business the proprietor is very frequently also the production manager, and is accustomed to conduct all manufacturing and packing matters on his own initiative, but with the expansion in the area or volume of trade comes the need for delegating authority to others, who must accept responsibility for the efficiency and the smooth running of their departments or spheres of operation, for only in this way can production standards and sound methods of management be instituted and maintained. Each section must be run on thoroughly modern lines, and it cannot be denied that a high degree of organising ability is demanded at the present time in the co-ordination of the different activities.

With regard to the purchasing side of the modern food factory, new materials and different combinations of materials are rapidly being substituted for old, involving corresponding modifications in the processes to which they are subjected as well as periodical changes in technique and industrial organisation. In the interests of economy, therefore, the buying department should be supervised in a manner calculated to avoid waste and the incorrect employment or application of such materials as oils, essences, edible colours, chemicals, colloids, etc., while the need for liquid capital to liquidate trading indebtedness, and to meet pressing overhead expenses renders effective control of materials and stores absolutely essential.

Stock Order Book

It is important to bear in mind that a large turnover usually absorbs much less capital, relatively speaking, than does a small turnover. Unless, therefore, there are some very urgent reasons for adopting such a course, the stock of flavourings, gums, spices, emulsifying ingredients, gelatines, glues, and other similar food producing materials and stores, should never be permitted to dwindle below that minimum which experience has proved to be advisable to carry in order to maintain output at a satisfactory profit-earning level. Directly the number, weight, or quantity under any heading threatens to reach the minimum, it is a good practice to record the fact in a special stock order book kept for that purpose, this book being provided with columns or sections for the insertion of the date, a description of the materials or stores required, the name of the person, room, or department needing the stock, the quantity required, and the initials of the departmental manager or other person authorising the order. An extra column could also be provided for any remarks or observations connected with any of the transactions, and a good general form is indicated below:

FOOD MANUFACTURER'S MATERIALS ORDER BOOK.

Date.	*Description of Materials Required.*	*Department.*	*Quantity Required.*	*Order Authorised by—*	*Remarks.*

A separate section should be provided for office use on the right-hand side of each opening of the book, comprising columns for showing the date of each order; the order number; the name and address of the suppliers or purchasing agents; the date on which the materials actually arrived on the factory premises; and the folio on which the entry has been recorded in the inwards book kept in the receiving or packing department. Orders should be made out on printed forms, giving the date, the order number, and a detailed description of the stock required, and it should be made quite clear to suppliers that any deviation from the particulars as enumerated will be entirely at their own risk. Alternative materials or other variations may be specifically authorised, either on the order form or in an accompanying letter, but in the absence of such authority the food manufacturer should compel suppliers to conform to original specifications. Each order form should be initialled by the departmental manager, and to facilitate future references to details it is usually found convenient to use a duplicate order book containing thin tissue leaves, each alternate sheet being printed in the pre-

scribed form, and the remaining leaves constituting plain copy sheets. The orders can then be made out on the pen or the pencil carbon copy principle, each original form being forwarded to the supplier or agent, and the copy preserved intact in the book.

Purchasing

Some food manufacturers decline to accept materials or stores unless a delivery or advice note is produced, giving the order number and essential particulars. Although the strict observance of such a rule may be extremely difficult or inconvenient, it is of the utmost importance that both the quantity and the quality should be carefully compared with the original order before actually taking any materials or stores into stock. Goods or articles inferior to order, or in any other way unacceptable, will be returned to the senders, and if delivery has already been booked in the inwards department a corresponding entry would be necessary in the outwards book. Remittances forwarded with orders, and payments made at the time of the delivery, will be recorded on the credit side of the general cash book, or in the cash payments book, as the case may be, and the amounts posted direct to the debit side of the respective goods or stock accounts, while the invoiced cost prices of all materials bought on a credit basis will be entered in the factory purchases journal from where the amounts can be posted to the credit side of the particular personal accounts kept in the purchases or bought ledger.

Invoices received should go direct to the purchasing department, where they should be stamped by means of a rubber stamp, or other suitable impression, on the lines indicated below:

INVOICE STAMP.

Materials received by.....
Quantity checked by.....
Prices and Discounts verified by.....
Approved by.....
Passed for Payment by.....
Inwards Book Folio.....
Purchases Book Folio.....
Invoice No.....

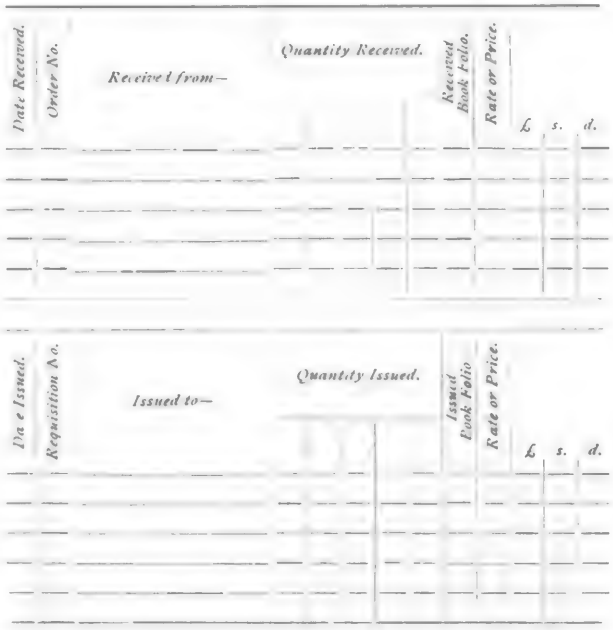
Supplies Received Book

After being initialled by the storekeeper, the invoices will be passed through the Supplies Received Book. This book should be provided with columns for the insertion of the date, the order number, name of suppliers or consignor, the quantity actually taken into stock, and the price. All issues made from stock will be recorded in the Supplies Issued Book, ruled in the same manner as the Received Book, the columns being used for entering the dates of issue, the requisition numbers, the name of the department, and the quantities actually issued. The need for using written requisitions arises mainly from the fact that certain food factory supplies are constantly moved from one warehouse or room to another, necessitating new instructions being given to the storekeeper to ensure that each manufacturing or packing process is charged with the full materials cost.

Factory Stores Ledger

Materials and stores should be grouped under definite headings for entry in the factory stores ledger, these headings varying according to the size of the business and the particular product or products manufactured. In some cases a separate sugar account or a separate flour account will be needed, while colours and essences, acids and chemicals, and wrapping paper and display outers, etc., will have separate accounts in the ledger. Whether or not the invoiced cost prices are shown in these accounts is a matter for each individual food manufacturer or firm to decide, but after due allowance has been made for wastage and spillage it should be possible to ascertain the precise quantity on hand under any heading, each item recorded in the Received Book being entered on the debit or received side of its respective account, while each item recorded in the Issued Book is shown on the credit or issued side. One of the most satisfactory forms of ruling for the stores accounts is shown below:

FOOD FACTORY STORES LEDGER ACCOUNT.



Prime Cost of Manufacture

The prime cost of food manufacture consists of the cost of materials, stores, labour, and such direct expenses as foremen's wages, the salaries paid to inspectors and superintendents, the rent of the factory, depreciation of machines, plant and other wasting assets employed, also the expenditure involved in the maintenance of tools, equipment and the business premises, etc. In order to ascertain the total cost, however, the fixed charges will have to be added to the prime cost, including all office expenses, selling expenses, travelling ex-

penses, commissions, salaries paid to engineers, counter salesmen, storekeepers, assistants engaged on research work, managers' or directors' remuneration and other management and working expenses.

Wages Book

Broadly speaking, the wages may be divided into day-work wages and piece-work wages, these two different kinds of operations being subjected to a slightly different internal control. Each worker who is paid at a straight hourly rate should be provided with a card on which to enter details of the work performed on each day of the week, these cards being initialled by the foreman or charge hand whose records will be passed on to the office daily for purposes of comparison and to enable the wages sheets to be prepared. The particulars to be shown on the wages sheets will consist of the number and the name of each worker, the number of hours worked each day, the total hours worked during the week, the rate of pay, the gross wages, the various stoppages and deductions, and the sum payable, these particulars corresponding with the daily time sheets kept by the foreman, charge hand or factory clerk. As soon as the sum payable to each worker has been calculated, independently checked and set down on the sheets, the amounts can be added up and the details recorded in the wages book.

All workers who are paid at a straight piece-rate should register the time at which they commenced and ceased work each day, preferably by means of a time clock or recorder, the cards on which these records are made being quite distinct from those used by the day workers. All these piece-workers' cards should be passed on to the progress office to enable the various items to be properly allocated and the wages cost charged against the different jobs, operations, or contracts, and when this analytical work has been carefully checked by separate clerks, the wages sheets may be prepared, and the details subsequently entered in the wages book. In some cases the amounts payable to the workers are recorded in a simple wages book, and a summary made at the end of the week showing the totals under the different headings, while to avoid the need for re-writing the numbers and the names of the workers every week, the other columns may be repeated on the same page to cover as long a period as the size of the wages book will permit.

Although it may be sufficient for all practical purposes to show the total cost of the labour expended on each job, operation, or contract, it is much better to classify the various operations under suitable headings.

BIOLOGICAL PURIFICATION of DAIRY WASTES

THE satisfactory disposal of cheese-factory wastes has probably caused more trouble than that of any other type of effluent from the dairy industry. Up to the present, the most successful method was that described by Eldridge (*Mich. State Eng. Coll. Expt. Sta. Bull.*, 1929, 24; 1930, 28; 1931, 36), who found that wastes containing up to 10 per cent. whey could be treated on a deep biological filter, a reduction in biological oxygen demand (B.O.D.) of the order of 90 per cent. being obtained. The filter effluent was, however, approximately as strong as town sewage and was therefore unfit for discharge into a stream.

Muers (*J.S.C.I.*, 1936, **55**, 71-77 T) has carried out an investigation to find a method of purifying a 10 per cent. solution of whey (representing a very strong effluent) sufficiently to comply with the standard of the Royal Commission on Sewage Disposal for sewage effluents discharged into a stream—*i.e.*, B.O.D. not greater than 2 parts per 100,000 and suspended solids not greater than 3 parts per 100,000. It was found that by passing the 10 per cent. solution of whey through a biological percolating filter at a rate of 50 gal. per cubic yard per day, a reduction of 90 to 95 per cent. in B.O.D. was obtained. Both the efficiency of purification and quality of the effluent improved as either the rate or concentration was reduced, but that a given quantity of organic matter was oxidised with maximum efficiency when applied in high concentration. Thus it would be undesirable to dilute a strong factory waste before filtration. Although a second biological filtration was found to be relatively ineffective as a means of oxidising the residual material left in the effluent from the first filtration, aeration in the presence of a spontaneously formed active sludge caused rapid and complete purification of the filter effluent, a product complying with the Sewage Commission standard (B.O.D. not greater than 2 per 100,000) being obtained.

An interesting advance has also been made in this country in the investigation of methods of purification of waste waters from dairies and milk products factories states the annual report of the Water Pollution Research Board.

Through the Milk Marketing Boards the industry is co-operating in the work of solving this problem, and during the past year has contributed £3,300 towards the cost.

The experiments already carried out in the laboratory, and particularly on a large scale at a factory, have demonstrated that it is practicable to purify milk washings, such as those from milk collecting and distributing depots, creameries and condensed milk factories, by the activated sludge process, or by biological oxidation in percolating filters operated under certain conditions.

In addition to showing how the waste waters can be purified, the investigation has drawn attention to unnecessary losses of milk, cream, buttermilk, skim milk and whey in the wastes. Suggestions have been made and have been adopted at some factories for reducing these losses, thus effecting direct savings and reducing the cost of treatment of the effluents.

The report emphasises that unless satisfactory methods of treatment and disposal of sewage and industrial effluents are more widely adopted, there will be considerable difficulty in providing the large volumes of water of good quality necessary for domestic, agricultural and industrial purposes.

INFORMATION and ADVICE

Lemon Cheese—Pepsin and a Dried Extract Product from Hogs' Stomachs—Packing Salt Pork in Brine—French Butter Standards—Buttermilk—Almond Paste—Evaporating Honey

Lemon Cheese

2,095. *Would you inform me how to prepare a good quality commercial lemon cheese to retail to bakers—one that will not boil over on baking?* (Liverpool.)

The cause of lemon cheese boiling over during baking is attributable to too high a percentage of water. For confectionery use the amount of water in lemon cheese should be kept as low as possible. A suitable recipe is as follows:

Sugar	46 lb.
Butter or margarine	7 ,,
Lemon cheese	3 ,,
Salt	2 oz.
Citric acid	4 ,,
Oil of lemon	3 drams
Agar-agar	¾ oz.
Egg yolk	16 lb.
Liquid pectin	1 ,,
Water	5 ,,
	78 ,,

Boil to 68 lb. finished weight.

Pepsin and a Dried Extract Product from Hogs' Stomachs

2,096. *We are interested in the handling of hogs' stomachs and would appreciate any information you can give us regarding the handling of these for the production of* (1) *pepsin and* (2) *as a dried extract product for the cure of anæmia.* (Ulster.)

(1) *Pepsin.* The general method of preparation from hogs' stomachs is by extraction with water acidulated with hydrochloric acid and subsequent recovery of the extracted pepsin by fractional precipitation, dialysis, etc. The preparation and assay of this substance is a matter requiring the intervention of a skilled organic chemist with special experience.

(2) There have been some researches made in the use of preparations of certain portions of the pig stomach in connection with the treatment of pernicious anæmia, but they have not come into general use as have preparations of liver. E. Menlengracht (*Acta. Med. Scan.*, 85, 50-78 (1935), states: "Dried defatted pulverised preparations from the cardiac gland region of the pig stomach possess a certain anti-anæmic function, but much less than the pyloric region. The fundus region seems to be inactive in this respect. The conclusion drawn is that the enzymic factor and the anti-anæmic factor are anatomically disassociated.

Packing Salt Pork in Brine

2,097. *Is it possible to pack salt beef, salt pork, pork trimmings, all pickled in brine, into 25-lb. tins? Is a lacquer necessary and if so what?* (British Guiana.)

We presume that you refer to the product usually put up in tierces. So far as we have been able to ascertain, tins have not been hitherto used for the purpose, but we see no reason why tins of 25 lb. capacity, well lacquered with a hard, resistant lacquer, should not be employed. The tins should be cylindrical and should be closed by double-seaming. The essence of the matter is to ensure the obtainment of a lacquer likely to resist the effects of a saturated solution of salt and to carry out some trials with the actual products.

French Butter Standards

2,098. *Can you inform us why the butter packed in tins at Morlaix, Brittany, and exported to the tropics, is not used greatly in France? The butter is heavily salted.* (London.)

Although we are unable to obtain any direct information about Morlaix butter, we have been able to obtain the standards and composition of butter which is allowed to be exposed for sale in France.

Such butter must contain 82 per cent. butterfat (or 18 per cent. material not fat) and not over 16 per cent. of moisture. The amount of *salt* must not exceed 10 per cent. The nature of Morlaix butter is probably such that it does not conform to the above standards, possibly as regards salt content. If butter contains 16 per cent. moisture, it can hold only about 6 per cent. salt in solution. If the butter is salted above this, some salt will have to be in solid form; this will result in pushing up the material not fat above the 18 per cent. standard. We think that the heavy salting necessary for the West Indian market and to ensure long keeping quality precludes the butter from local sale.

Buttermilk

2,099. *We understand that the "effectiveness" of buttermilk is largely dependent on the lactic acid bacteria, and should be grateful for information on this subject together with general information regarding buttermilk.* (Edinburgh.)

Buttermilk as a beverage has grown to cover a number of liquids for human consumption. The original buttermilk was obtained from the churning of cream of high acidity (0·3 to 0·7 per cent. lactic acid). The buttermilk so obtained was sometimes allowed to develop acidity up

to 0·9 per cent. and, although precipitation of casein occurs in bulk of that acidity, no such separation of clot occurs in buttermilk owing to the very fine state of the curd. The buttermilk thus used was of high viscosity, giving a sense of body to the palate; its sourness was appealing and it also possessed an appealing aroma and flavour characteristic of full-flavoured butter. Of course the acidity developed through the agency of lactic acid bacteria—a mixture of types being present.

Cultured buttermilk is made from separated milk by allowing lactic acid fermentation to occur with a special starter, which is similar to butter starter in type of bacteria. The acidity is allowed to rise to 0·3 to 0·6 per cent. Higher acidities give too hard a clot and it is then difficult to get a smooth beverage.

The benefit derived from buttermilk is put down to the therapeutic inhibition of intestinal putrefaction by lactic acid bacteria. These beverages therefore are used in cases of auto-intoxication in man. It appears that large numbers of lactic acid bacteria invade the intestines on drinking these and other fermented beverages and overcome the protein splitting organisms, and thus dominate the position as regards bacterial action in the small intestine and colon. The lactic acid formed by fermentation in the intestines is harmless.

Other beverages which accentuate this phenomenon consist of youghourt, bulgaricus milk and acidophilus milk. The *bulgaricus* type of organism has been found to be specially beneficial in intestinal disorders such as sluggishness or stasis.

Almond Paste

2,100. *We are considering going into the manufacture of almond paste and would appreciate any information which you can give us with regard to this.* (Canada.)

The following recipes should meet your requirements:

1. Boiled Almond Paste.

16 lb. lump sugar.
4 pints water. } Boil all to 240° F.
1 lb. glucose.
8 lb. ground almonds.
8 eggs or 18 yolks.
½ oz. egg colour (liquid measure).
¼ oz. essence of almonds (liquid measure).

Method.

Place the ground almonds in a bowl, make a bay, add eggs (previously beaten) and egg colour. Mix some of the almonds with the eggs, then pour in the boiling mixture, and mix all well together. Finally stir in the almond essence.

2. Almond Paste.

4 lb. castor sugar.
4 lb. icing sugar.
4 lb. ground almonds.
12 eggs.
A little egg colour.

Method.

Sieve icing sugar and mix with ground almonds. Heat the castor sugar and eggs to 90° to 100° F., and add to the mixture and mix all to a paste.

Do not over-work.

This almond paste can be cheapened by using different amounts.

Evaporating Honey

2,101. *Can you suggest a method of evaporating honey down to the consistency of toffee, without exceeding a temperature of 120° F. at the most, and preferably 100° F., in quantities of only about 2 gal. at a time and with apparatus costing not more than is appropriate to small-scale working or apparatus normally available in sweet-making?* (England.)

The proper way of doing this would, of course, be in a vacuum pan, but the cost of this would be considerable considering the small quantities with which it is desired to deal. A cheaper, but more tedious, method consists of spreading the honey in thin layers (about ¼ in. deep) on trays, and placing these trays in a rack in a room heated to 100° to 120° F., through which air is drawn by means of an exhaust fan. Alternatively, an insulated tunnel, made to take several trays at a time, may be used, and air drawn through the tunnel by means of a fan.

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The Antirachitic Value of Canned Salmon

(*Continued from page* 134.)

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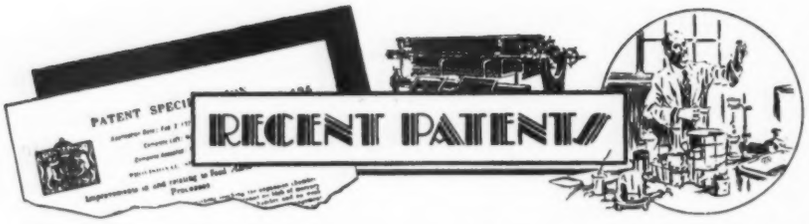

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Latest Patent Applications

2670. LUHNOW, H. W., and MCGEHEE, W. L.: Manufacturing dried foodstuffs. January 29.

2789. ATLANTIC COAST FISHERIES CO.: Manufacture of vitamin product. January 30. (United States, October 10, 1936.)

2790. ATLANTIC. COAST FISHERIES CO: Manufacture of vitamin product. January 30. (United States, December 3, 1936.)

3418. MARTIN, G.: Condiment receptacles, etc. February 5.

3505. HUZENLAUB, E. G.: Treatment of rice. February 5.

3598. WILCOCK, H. H. C.: Tea packages. February 6.

3612. ROCKWOOD AND CO.: Manufacture of chooolate. February 6.

3752. DELEGARD, V.: Apparatus for dicing foodstuffs. February 8.

3860. MEARES, C. H.: Apparatus for crushing, etc., cell tissues in manufacturing tea leaf. February 9.

3915. GEHLE, H.: Production uniform milling products. February 10.

4040. LORING, F. H.: Manufacture of wheaten flour. February 11.

4055-4056. WHITE, S. M.: Manufacture of sweetmeats. February 11.

4165. HAWORTH, J.: Biscuit tin. February 12.

4243. NEVISON, F. J.: Preserving fish, etc. February 12.

4276. POLLAK, J. E. (INTERNATIONAL PATENTS DEVELOPMENT CO.): Refining sugar solutions. February 12.

4534. SCHLYTTER, P.: Containers for eggs, etc. February 15.

4828. LIDDELL, R. S.: Manufacture of cheese. February 17.

4957. ROSE BROS. (GAINSBOROUGH), LTD., ROSE, A. G.: Carton-filling machines. February 19.

5091. WEIBULL, N. R. M.: Apparatus for preserving, etc., grain in containers, etc. February 19.

5222. TURNBOW, G. D.: Production of sugar-containing product. February 22.

5285. AKTIESELSKABET DANSK GAERINGS-INDUSTRI: Production of yeast. February 22.

5308. REWALD, B. A.: Production of nutrition products. February 22.

5340. GOLDBERG, A.: Manufacture of concentrated vitamin extracts from fruit, etc. February 23.

Complete Specifications Accepted

460,588. COW AND GATE, LTD., GATES, W. R. V. ST. J., and TAVROGES, J.: Drying of milk, milk products, and milk mixtures.

460,697. BUEB, J., and BUEB, H.: Method and apparatus for drying coffee beans. (March 4, 1936.)

460,811. STALEY MANUFACTURING CO., A. E.: Processes of preparing soya beans for consumption, and the products resulting therefrom.

460,834. LATTRE, P. DE: Apparatus for accelerated crystallisation.

460,891. BROOKE BOND AND CO., LTD. (WALKER, F.): Drying or conditioning apparatus.

460,972. MOBLEY, DR. L. K.: Bacterial milk products.

460,974. ALDER, G. R.: Tangential honey extractor.

461,064. AKTIEBOLAGET ISACSONS EMBALLAGEFABRIK and ISACSON, F. V.: Cartons for eggs.

461,072. VEREINIGTE DEUTSCHE METALLWERKE AKT.-GES. ZWEIG-NEIDERLASSUNG SÜDDEUTSCHE METALLINDUSTRIE: Containers or storage vessels for beer or the like. (Divided out of 9508/36.)

461,184. HIMMELSBACH, H.: Manufacture of a beverage from whey.

461,200. GENERAL FOODS CORPORATION: Pectin and method of preparing same.

461,411. HOPKINSON, L. T.: Production of fish meal and oil. (May 10, 1935.) (Divided out of 461,343.)

461,637. GEDDES, W. M., and CLELAND, LTD., W. W.: Packing for eggs and other fragile articles.

461,470. HESCHE, K.: Egg cartons.

461,269. DU PONT DE NEMOURS AND CO., E. I.: Production of baked cereal products.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

452,682. **Treating grain and seeds; preserving crops; food for animals; cheese.** EKHARD, W., 17c, Kreuzstrasse, Pankow, Berlin.

Animal and vegetable materials which are unsuitable for human or animal nutrition owing to bad taste and odour are treated to remove the bad taste and odour and to improve their keeping properties by adding an aqueous solution of a fermentable sugar such as glucose, invert sugar, lactose, or neutralised whey, to which has been added one or more micro-organisms which form lactic acid, together with one or more micro-organisms which form alcohol, or a micro-organism which produces both a lactic acid and an alcoholic fermentation, and separating the fermentation liquid from the material after the fermentation. The materials treated include meat, brains, liver, marrow of bones, and meal from animal carcasses, fish meal, cod liver oil, and other animal or vegetable oils or fats, cheese waste, soya bean lecithin, skins of dried grapes, oil seeds, and other materials used for producing vegetable oils, horse-chestnuts, lupin seeds, malt culms, soya beans, millet, oats, wheat, barley, and other cereals, and the residue left after extracting lecithin and oil from soya beans. In an example, meat or fish meal is produced by cutting the meat or fish to pieces, boiling in water, separating the liquid, drying the residue at 130° to 140° C. and covering it with a solution of a fermentable sugar to which is added a mixture of, for example, *B. bulgaricus* and *S. thermophilus* from youghourt, together with a wine or other yeast, the fermentation proceeding for about 12 hours at about 42° C. The liquid is next drawn off and the meat or fish washed with a highly diluted aqueous alkaline solution—*e.g.*, of sodium bicarbonate or ammonia—to remove the lactic acid formed. Alternatively, *B. lactis acidi* or *B. Delbrucki* may be used as the lactic acid-producing micro-organisms or a micro-organism giving rise to both lactic acid and alcoholic fermentation such as *thermo-bacterium mobile* may be employed. Cheese waste is similarly treated to regenerate it, the fermentation being carried out at about 30° C. for about 12 hours, and the separated fermentation liquid, which contains a considerable amount of fat, is concentrated and added to the fermented casein, which, after addition of melting salt, is then melted. Soya beans and lupin seeds are soaked in water prior to treatment. Lupin seeds, after fermenting, are washed several times at 50° to 70° C., if desired with addition of sodium carbonate or bicarbonate or other alkaline agents, to neutralise them, after which the fermentation is repeated. After treatment the beans or seeds may be used as a cattle food in a moist condition, the soya beans being unwashed and still acid, or they may be washed and dried before use.

The specification as open to inspection under Sect. 91 comprises also the use in the process of either the alcohol-producing or the lactic acid-producing micro-organisms, or of other micro-organisms which during fermentation do not give rise to unpalatable by-products. In a modification the sugar solution is added to the animal or vegetable materials after the fermentation has taken place. This subject-matter does not appear in the specification as accepted.

LATEST TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

APLO.—565,829. **Juices (not alcoholic) made from apples.** JOHN WILLIAM PARKIN, 12, Felstead Road, Wanstead, London, E. 11. March 10. (By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the word "Aplo".

BLUE FLAG BRAND.—574,158. **Canned**

orange marmalade and canned fruit jams. TOICHIRO NAKASHIMA, 824, Sandagaya Yonchome, Shibuya-Ku, Tokyo-Shi, Japan. February 17. (Associated.)

BREKNAX.—571,133. **Rusks and biscuits.** FREDERIC LOUIS BICKER, Parkflat Marlot 25, The Hague, Holland. February 24.

CHARLIE.—574,824. **Ice and ice-cream.** BEVO, LTD., 27, Church Street, Barnoldswick, Yorkshire. March 3.

CHEERY ANN.—572,941. **Pickles and sauces.** EMILY EDITH WILKINSON, 159, Winter Road, Southsea. February 24.

COLETTE. — 574,546. **Beverages and cordials (not alcoholic, not aerated, and not medicated), syrups (not alcoholic), and flavourings (not alcoholic) for foods and beverages.** THE LONDON ESSENCE CO., LTD., Lofresco Works, 53, Glengall Road, Peckham, London, S.E. 15. March 10. (By Consent.)

CO-OPTIMIST.—574,900. **Substances used as food or as ingredients in food.** MR. PICKWICK, LTD., Dingley Dell, St. George's Road, Cheltenham, Gloucestershire. March 10.

Registrations Nos. 511,037 (2715) and 512,514 (2725) will be cancelled if and before the applicants' mark is registered.

573,667.—**Substances used as food or as ingredients in food.**

CREAMOLA FOOD PRODUCTS, LTD., 114, Cornwall Street, Glasgow, S. 1. February 17. (Associated.)

CREAMOLA. — 573,669. **Rice custard powder.**

CREAMOLA FOOD PRODUCTS, LTD., 114, Cornwall Street, Glasgow, S. 1. February 17. (Associated.)

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the device of a seal and the words "The Seal of Quality".

CURFEW.—574,386. **Substances used as food or as ingredients in food, but not including fruits or vegetables and not including any goods of the same description as fruits or vegetables.** A. J. MILLS AND CO., LTD., Colonial House, Tooley Street, London, S.E. 1. March 3.

DELICITY. — 574,996. **Cheese.** THE SCOTTISH CO-OPERATIVE WHOLESALE SOCIETY, LTD., 95, Morrison Street, Glasgow. March 10.

ELECTA.—574,348. **Canned Meats.** MACPHERSON, TRAIN AND CO., LTD., Adelaide House, London Bridge, London, E.C. 4. February 17.

Canned meats and goods of a like kind will be struck out from the goods of registrations Nos. 224,505 (1124) and 284,977 (1505) if and before the applicants' mark is registered.

FRU-VITA. — 573,538. **A preparation composed of fruit, fruit flavourings, and sugar for use as a filling for sandwiches.** ALBERT VICTOR FEASEY, 73, Chudleigh Road, London, S.E. 4. March 10.

GLASS JAR LABEL.—B 573,884. **Man-**

darin oranges. RICHARD B. GREEN AND CO., LTD., 54, Stanley Street, Liverpool, 1. February 24.

User claimed from January 19, 1934.

The applicants undertake that this mark, when registered, and the marks Nos. B 418,696 (2301), B 568,862 (3042), B 573,885 (not yet advertised), B 573,886 (3074), and any other marks associated therewith, shall be assigned or transmitted only as a whole and not separately.

HEYDAY. — 574,653. **Condensed milk.** LEON MOOCHNIK, trading as J. C. Ratner and Co., 146, Bishopsgate, London, E.C. 2. February 24.

PLASBER.—574,654. **Edible fats.** ARTHUR BERLANDINA, LTD., Dunster House, Mincing Lane, London, E.C. 3. February 24.

LITTLE MISS MUFFET.—573,914. **A preparation of rennet for use in making junket.**

CHR. HANSEN'S LABORATORY, LTD., Astor House, Aldwych, London, W.C. 2. February 17.

Registration No. 548,563 (2923) will be cancelled if and before the applicants' mark is registered.

PICKWICK.—573,955. **Rolled oats, soap powder, gravy powder, blancmange powder, custard powder, flaked maize, cornflour, table jellies, salad dressings, sponge mixture, cake mixtures, cornflakes, flaked wheat, beans, peas, mustard, flavouring essences (non-alcoholic), rice, tapioca, macaroni, vermicelli, spaghetti, pearl barley, lentils, sago, pea flour, semolina, desiccated cocoanut, and bun flour, all being articles of food or ingredients in food.**

WHITE, TOMKINS AND COURAGE, LTD., 48, Mark Lane, London, E.C. 3. March 10. (Associated.)

PRO-FERIN. — 572,459. **Substances used as food or as ingredients in food.** STARCH-FREE FOODS, LTD., 48, Mark Lane, London, E.C. 3. March 3.

SPRO.—571,629. **All goods in Class 42, which includes substances used as food or as ingredients in food, but not including edible oils or edible fats, and not including any goods of the same description of any of these excluded goods.** ASPRO, LTD., Basildon House, Moorgate, London, E.C. 2. February 24. (Associated.)

THREE KAYS COFFEE. — 573,245. **Coffee.**

THE LORESHA AND KIORA ESTATES, LTD., 41, Friar Lane, Leicester. February 24. (By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the words "Three Kays".

TULIP.—573,653. **Margarine.** BALLOCHMYLE CREAMERY CO., LTD., 4, Watergate, Tudor Street, London, E.C. 4. February 24. (By Consent.)

NEW COMPANIES

Beales (Westcliff), Limited. (322,634.) Registered January 2, 1937. To carry on the bus. of public caterers, restauranteurs, etc. Nom. Cap.: £2,500. Subs.: F. H. Beale and Mrs. D. Beale, 50, The Ridgeway, Westcliff.

British Atlantic Fruit Company, Limited. (322,984.) Registered January 11, 1937. 3, Abchurch Yard, Cannon Street, E.C. 4. To carry on the bus. of growers of and dlrs. in fruit and vegetable produce, etc. Nom. Cap.: £10,500 in 10,000 pref. shares of £1 and 10,000 ord. of 1s. Dirs.: A. H. Mundey, 14, Wrottesley Road, Woolwich, S.E.; S. L. Smith, 26, Green Court Gardens, Addiscombe; G. H. E. Yates, 24, Moreton Road, Croydon; G. D. Yates, 24, Moreton Road, Croydon.

Caxton Chocolate Company, Limited. (323,551.) Registered January 27, 1937. To carry on the bus. of cocoa and chocolate mnfrs. and mchts., etc. Nom. Cap.: £10,000. Dirs.: Not named. Remun. of dirs.: As voted by the company. Subs.: Vera A. K. Cuthbert, 7, Bucklersbury, E.C. 4 (clk.), and Gladys M. Brockhurst, 7, Bucklersbury, E.C. 4.

Chelsea Food Products, Limited. (322,876). Registered January 8, 1937. To carry on the bus. of flour and provender millers and dealers, etc. Nom. Cap.: £10,000 in £1 shares. Permt. dirs.: A. Jedlin, address not stated; S. Milch, 4, Talbot Square, Hyde Park, W. 1.; M. Arram, 11, Queen Street, E.C. 4.

Clover Milk Bars, Limited. (323,338.) Registered January 21, 1937. 86, New Street, Birmingham. To carry on the bus. of dairymen, etc. Nom. Cap.: £5,000. Dirs.: J. W. H. Brown, Fernleigh, Street, Somerset; T. B. Hicks, The Mount, Birmingham Road, Wylde Green, Sutton Coldfield.

Cornish Fish Products (London), Limited. (322,787.) Registered January 6, 1937. 16, Eastcheap, E.C. To carry on the bus. of mnfrs. of fish products, etc. Nom. Cap.: £5,000. Dirs.: R. A. G. Tilney, 25, Sussex Place, Regent's Park, N.W. 1; S. A. Cohen, The Grange, Lawn Road, Beckenham, Kent; F. H. Small, 62, Park Lane, Wallington, Surrey; D. J. Ferguson, 89, Madrid Road, Barnes, S.W. 13; G. W. Fenton, Chylehan, Marazion, Cornwall.

Floris Bakeries, Limited. (322,578.) Registered January 1, 1937. 4, Moorgate, E.C. 2. To carry on bus. as biscuit mnfrs., etc. Nom. Cap.: £1,000. Dirs.: B. S. Rowntree, North Dean House, Hughenden, Bucks; J. S. Rowntree, Wards Farm, Radnage, Bucks; Maria Floris, 2, Northcote House, Heath Shee, Hampstead, N.W. 3.

W. Gleason and Company, Limited. (323,272.) Registered January 19, 1937. 30a, Strand Street, Liverpool. To carry on the bus. of mnfrs. of and dlrs. in packet foods; wholesale grocers, etc. Nom. Cap.: £3,000. Dirs.: R. D. Roberts, Gwynfa, Calderstones Road, Liverpool; J. N. Roberts, The White Cottage, Barnston, Ches.; D. K. Hughes, Hafryn, Corwen, Merioneth; E. W. Roberts, Bennar, Hinderton, Ches.

Gwenlis Food Products, Limited. (322,841.) Registered January 7, 1937. To carry on the bus. of mnfrs. of and dlrs. in health and dietetic foodstuffs, etc. Nom. Cap.: £3,000. Dirs.: I. R. James, Glen Barlands, Bishopston, Swansea; Dr. G. A. Stephens, 61, Walter Road, Swansea; G. Thomas, Brynmill Bakery, Swansea.

Jessops Lactic Sugars, Limited. (322,694.) Registered January 2, 1937. To take over the bus. of a baker and wholesale bakers' mnfr. cd. on by J. A. Jessop at 71, Lampton Road, Hounslow, and at Wimbledon Park. Nom. Cap.: £4,000. Dirs.: To be appointed by the subs. Subs.: R. P. Young, Clarence Chambers, 39, Corporation Street, Birmingham; J. A. Jessop, 71, Lampton Road, Hounslow.

Lilian Milk Bars, Limited. (322,806.) Registered January 6, 1937. 1-3, St. Paul's Churchyard, E.C. 4. To carry on bus. as milk bar proprietors, etc. Nom. Cap.: £500. Dir.: B. Oberman, 87, Bethune Road, N. 16.

M. Lumley, Limited. (322,848.) Registered January 7, 1937. Revenue Buildings, Chapel Road, Worthing. To carry on bus. as bakers, confectioners, etc. Nom. Cap.: £1,000. Dirs.: M. Lumley, 109, Chapel Road, Worthing; Annie E. Lumley, 109, Chapel Road, Worthing; P. H. Lumley, 64, Shakespeare Road, Worthing; Mollie V. Poland, 4, Salisbury Road, Worthing.

Malta Fish Canning and Oil Refineries, Limited. (323,136.) Registered January 15, 1937. To carry on the bus. of fish canners, oil refiners, etc. Nom. Cap.: £1,000. Dirs.: O. F. Gollcher, The Norman House, L'Undina, Malta; P. T. R. U. Basset, Cavendish Hotel, Jermyn Street, S.W. 1.

Metcalfe Ideal Products, Limited. (323,060.) Registered January 13, 1937. To carry on the bus. of mnfrs. and mchts. of food slicing machines, automatic scales, slot machines, etc. Nom. Cap.: £2,000 in 5s. shares. Dirs.: Not named. Subs.: J. B. Crouch, 116, Chancery Lane, W.C. 2; P. O. Ansell, 54, High View Gardens, Potters Bar, Middlesex.

Stansted Agricultural Engineers, Limited. (322,607.) Registered January 1, 1936. To take over the bus. of agricultural and general engineers heretofore cd. on by D. Connell and previously by How and Salmons as successors to Pamplin Bros. at Stansted, Essex, and Braughing, Herts. Nom. Cap.: £5,000. Dirs.: D. Connell, Green Farm, Ugley, Essex; A. H. Burton, Chickney Hall, Broxted; J. Salmons, 18, Portland Road, Bishop's Stortford, Herts; Ina A. P. Connell, Green Farm, Ugley.

Tin Boxes, Limited. (322,970.) Registered January 9, 1937. Liverpool Buildings, Thornton Street, West Hartlepool. To carry on the bus. of mnfrs. of and dlrs. in boxes, cages, bottles, cartons, crates, etc. Nom. Cap.: £15,000 in £1 shares. Permt. dirs.: R. France, Craigside, West Park, W. Hartlepool; D. Makinson, Park View, Lister Lane, Bradford; Miss M. A. Harrison, 1, Corporation Street, Stockton-on-Tees.

Trio Sales, Limited. (322,823.) Registered January 6, 1937. 17, Tooley Street, S.E. 1 To carry on the bus. of produce and provision factors, etc. Nom. Cap.: £1,000. A. E. Ayling, of 74, Castle View Gardens, Ilford, Essex, signs as dir.

W. T. Taylor (Bristol), Limited. (322,777.) Registered January 5, 1937. To take over the bus. of a wholesale confectioners cd. on by W. T. Taylor and H. Jenkins at 10, St. Paul's Street, Portland Square, and Midland Road, St. Philips, Bristol. Nom. Cap.: £6,000. Dirs.: W. T. Taylor, 131, Eastfield Road, Westbury-on-Trym, Bristol; A. G. Beames, 74, Stoke Lane, Westbury-on-Trym, Bristol; H. P. Jenkins, 58, Midland Road, Bristol.

Voysey and Hunt, Limited. (322,972.) Registered January 9, 1937. To take over the bus. of bakers and confectioners cd. on at 107, Poole Road, Bournemouth, and elsewhere as "Voysey and Co." and "Voyseys", and at 287, Ashley Road, Parkstone, Dorset, and elsewhere, as "W. T. Hunt and Co." Nom. Cap.: £27,000 in £1 shares (17,000 pref. and 10,000 ord.). Dirs.: W. T. Hunt, Perran, Sandecotes Road, Parkstone, Dorset; F. A. Voysey, 8, Sandbourne Road, Westbourne, Bournemouth; R. F. Pounsett, Woodhayes, Wynford Road, Parkstone; Mrs. C. L. Voysey, Rosamoyne, McKinley Road, Bournemouth.

Walker, Frank (Birmingham), Limited. (322,412.) Registered December 29, 1936. To carry on the bus. of mnfrs. and bottlers of mineral and aerated waters, etc. Nom. Cap.: £1,000. Permt. dirs.: N. P. Pitt, Shut End, Pensnett, Staffs; G. P. Packwood, Shut End, Pensnett, Staffs; R. D. Pitt, Shut End, Pensnett, Staffs.

Whitehall Machinery Company, Limited. (322,910.) Registered January 8, 1937. To take over the bus. of bakery engineers cd. on at Sydenham Street, Holbeck, Leeds, as "The Whitehall Machinery Co." Nom. Cap : £3,000 in £1 shares. Permt. gov. dir.: W. Radbill, Burley House, 258, Burley Road, Leeds.

G. C. Williams and Company, Limited. (323,179.) Registered January 16, 1937. 65, Crutched Friars, E.C. 3. To take over the bus. of a colonial and foreign produce mcht. cd. on at Crutched Friars, E.C., as "G. C. Williams". Nom. Cap.: £7,000. Dirs.: E. A. Cross, Mayfield, Southcliff Road, Friars Cliff, Christchurch, Hants (gov. dir. and ch.); F. E. Cross, Mayfield, Southcliff Road, Friars Cliff, Christchurch, Hants; C. F. Hidden, 86, Selby Road, Leytonstone, E. 11.

F. T. Wood and Sons, Limited. (322,724.) Registered January 4, 1937. To take over the bus. of flour millers and corn mchts. cd. on at Wreaks Mill, Birstwith, Yorks, as "F. T. Wood and Sons". Nom. Cap.: £30,000. Dirs.: G. B. Wood, Nellacre, Birstwith, York (permt.); F. R. Wood, Mill House, Birstwith, York (permt.); F. J. Wood and E. Wood, Birstwith, York.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.